Self-directed learning readiness and learning style preferences of adult learners

Babatunde O. Adenuga
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Self-directed learning readiness and learning style preferences of adult learners

Adenuga, Babatunde O., Ph.D.

Iowa State University, 1989
Self-directed learning readiness and learning style preferences of adult learners

by

Babatunde O. Adenuga

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Department: Professional Studies in Education
Major: Education (Adult and Extension Education)

Approved:

Signature was redacted for privacy.

In Charge Of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa

1989

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DEDICATION

This book is dedicated to my parents
Abeke and Kolawole Adenuga
CHAPTER 1

INTRODUCTION

Background

For a long time, approaches for adult instruction were subjective adaptations of those applied to children. New insights began with studies such as Cyril Houle's (1988). Through in-depth interviews with 22 adults about their motivation for engaging in continuing education he identified 3 overlapping learner types viz.: 1) the "Goal oriented" learners who use education for fairly distinct objectives, 2) the "activity-oriented" learners who take part for other social reasons not necessarily related to the content or intended purpose of the activity, 3) the "learning-oriented" learners who seek knowledge for its own sake.

Tough's (1971) work on self-directed learning builds further on this area of research to include not only why adults engage in learning activities, but also what they learn, how and what help they seek and/or obtain for learning. He found that 98% of his subjects were active learners who in the majority of their learning projects retained control of the day-to-day decisions about what subject matter to cover, how, when and where to carry out the learning efforts. This foundational effort pioneered a
different thrust in research on adult learning as has been witnessed by the last two decades or so of self-directed learning research.

Research on adult learning (Tough, 1971, 1978; Houle, 1988) indicates a marked difference in the way adults approach learning and the way the orthodox institutional learning/schooling system operates. Also, Knowles (1975) suggested that traditional pedagogy is incongruent with the pace of the naturally increasing need of the adult for self-direction which results in "a growing gap between the need and the ability to be self-directed (p. 55)."

Self-directed learning "is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes" (Knowles, 1975, p. 18). Most studies on self-directed learning in adult education adopt Allen Tough's learning project as an operational definition. He defines a learning project as "a highly deliberate effort to learn better ways of doing things, to gain new information and knowledge, to change perception, behavior or performance" (Tough, 1971).
Self-directed learning research has widened the conceptual domain of adult learning and awakened professional consciousness to a broader range of adult learning efforts. Depending on the way adult education is defined, participation has been reported to vary from 12%-98% (Cross 1984). When the definition is limited to formal didactics or organized learning, participation rates vary from 12-30% of the adult population. When the definition is equated with Tough's (1978) project, participation in adult learning becomes as high as 98%, with learners retaining control over major decisions about the learning effort and using professionals only about 10%-20% of the time.

**Self-directed learning readiness**

Because control of major decisions about learning efforts is central to the concept of self-directed learning, much research effort has been geared toward the measurement and definition of self-directedness. Although many approaches have been used to estimate inner-outer directedness of adult learners, the concept of self-directed learning readiness developed in the context of self-directed learning is most relevant. Certain factors related to attitudes, values, and abilities of adult learners have been associated with readiness for self-directed learning.
Based on these factors, Guglielmino (1977) developed a self-directed learning readiness scale (SDLRS) which estimates an individual's preparedness or readiness for self-directed learning. The range of total scores on this scale represents an inner-outer directedness continuum along which an individual's readiness for self-direction in learning can be located. The self-directed learning readiness scale estimates the extent to which an individual "possesses preferences and attitudes towards learning that are necessary for self-directed learning" (Hall-Johnsen, 1985).

Research shows that participation in self-directed learning is significantly related to inner-outer directedness or self-directed learning readiness (Hassan, 1981, Hall-Johnsen, 1985).

**Self-directed learning and learning style**

Adult educators continue to underscore the importance of optimizing learners' idiosyncrasies in adult teaching-learning transactions. Many factors--sociocultural, economic, educational, institutional, and other demographic and personological factors have been studied widely in relation to adult education in general, and specifically in relation to adult learning and adult learners. The adult education literature provides a plethora of definitions,
frames of reference, approaches and models about adult learning. Each captures to varying extents one or a combination of the different aspects of the multifaceted phenomenon called learning, based on equally divergent assumptions (implicit and/or explicit) about the learner and the context.

While there is yet no single universally acceptable, comprehensive theory of adult learning, andragogy, defined by Knowles (1970, p. 38; 1975, p. 19) as the "art and science" of facilitating adult learning continue to provide a useful frame of reference for conceptualizing adult learning. Andragogy is premised on certain assumptions about the adult learner's characteristics such as life experiences, self-concept, readiness to learn, and orientation to learning. Although operational definition varies, empirical and quasi-empirical data are cumulative in providing varying degrees of validation to these assumptions and implicit/derivative postulates.

The assumptions and theoretical premises of andragogy inadvertently overlap with adult experiential learning and more directly provide the theoretical bases or framework for self-directed learning. In addition, andragogy is consistent with the prevalent existentialistic (Freire, 1970; Wilson, 1984) lifelong learning philosophies of adult education in general.
Individual style preferences and predispositions to learning are some of the dimensions that have emerged as important foci of research and professional efforts to put learners' perspectives to bear on planning and the practice of adult education programs. These efforts have ranged from empirical research to expert opinion. Research findings are equally diverse. For example, Penland (1978) investigated why adults choose to learn on their own instead of taking a course, and found "desire to select style of learning" second in rank order only to "desire to set learning pace" among ten categories.

Learning style refers to an individual's preferred or characteristic *modus operandi* for responding to, articulating or processing stimuli or information in the context of learning (Price, 1983; Holtzclaw, 1985). Learning styles "give direction to learning behavior" (Cornett, 1983), and according to Smith (1982) are closely related to cognitive styles which refer to the idiosyncratic ways learners process information. Both concepts overlap and distinctions between them have been tenuous and controversial (Bonham, 1988a). Although both cognitive and learning style theories are highly diverse in number, approaches and context, field articulation theory is the most dominant in the cognitive style research tradition (Wilson, 1984; Bonham, 1988a). Field
articulation theory dichotomizes individual cognitive styles between two extremes of field articulation, namely, field independence and field dependence. Field articulation provides important parallelism to Kolb's learning styles model which is of central concern to this study.

Kolb (1976, 1984) defined learning as a cyclic process of transforming experience into knowledge, and developed a model for estimating an individual's learning style. Four learning style types--accommodator, assimilator, diverger, and converger, can be identified based on relative preference for, or orientation toward, abstract versus concrete modes of prehension (taking in information or experience); and active versus reflective modes of transforming the information or experience during learning. Kolb's learning style model is relatively adult-oriented and is grounded on experiential learning theory.

Important parallels and comparisons have been attempted between self-directed learning and learning and/or cognitive styles (Hebron, 1983; Cunningham, 1983; Brookfield, 1985); and between learning and cognitive styles (Bonham, 1988a). A cursory analysis of the relevant literature reveals characteristics of field independent learners as including--social independence, inner-directedness, (Witkin, 1969); impersonality (Wilson,
1984). Brookfield (1985) suggested that field independent learners prefer less structure in learning. Also Cunningham (1983) compares Witkin's and Kolb's models and implied that the field independence and field dependence styles are similar to Kolb's (1976) accommodator and assimilator learning style types, respectively.

Many scholars (Boshier and Pickard, 1979; Wilson et al., 1980; Hebron, 1983; Merriam 1987) advocate building on the many commonalities and similarities inherent in the different traditions and areas of research on adult learning, rather than further duplicative and unprolific additions to the already burgeoning array of learning models. Capitalizing on such relationships and inter-relationships will strengthen research capacity, optimize theorizing and foster integrated understanding of the different aspects of the learning process.

Hebron (1983) provides an eclectic multi-sequence stage model for relating theoretical constructs about the learning process. He schematizes the relationship between the molar and molecular dimensions of learning described by Wilson (1984), pooling materials from adult development, self-directed learning, cognitive styles, and experiential learning, research literature and theory bases. Hebron's conceptual exploration of the relationships, similarities and differences in Tough's self-directed, and Kolb's
experiential, models of learning steps/processes provides useful insights into their complementarity. His model suggests that Kolb's cognitive experiential learning framework offers a promising basis for conceptualizing and explicating aspects of the affective, practical/social molar dimensions of learning captured by the self-directed learning model. (A more detailed analysis is presented in the next chapter).

A major implication of findings from self-directed learning research and theory is an increasing advocacy for a shift in the focus of adult instruction from content to process orientation. Since professional assistance is only sought 10-20% of the time and many adults engage in self-directed learning, professionals are increasingly concerned about effectiveness and efficiency of such efforts. Thus self-direction in learning is not only becoming increasingly attractive to adult educators, but also gaining more acceptability as a goal for adult learning and education (Rogers, 1969; Illich, 1970; Smith, 1972; Knowles, 1975; Kidd, 1975).

Accordingly, ways and means for fostering self-direction in learning have been explored and proposed (Rogers, 1969; Smith, 1972; Kidd, 1975 Cheren, 1983; Harri-Augstein and Thomas, 1983; Ash, 1985; Welds, 1986a). The concepts of "learning how to learn" (LHL) and "self-
direction in learning" have emerged, with much scholarly support (Rogers, 1969; Smith, 1972; Kidd, 1975; Cheren, 1983; Harri-Augstein and Thomas, 1983) as viable and conceptually appealing approaches to enhancing effective adult learning.

Smith (1982) described learning-how-to-learn to involve the possessing, or acquiring, of necessary "knowledge and skill to learn effectively in whatever learning situation one encounters". He attributed increased concern about learning how to learn to the widespread and persistent interest in learning styles and research on self-planned learning; and identified learning style as a major component or sub-concept required to operationalize the "Learning how to learn" concept. Smith (1982) further conceptualized Learning-how-to-learn (LHL) as a construct involving a reciprocal and interpenetrating relationship among the three subconcepts (learning styles, needs, and training). Boydell 1976, (cited in Bould, 1981) included "learning how to learn" and "adaptive competences" or modes as two of the requisite components of self-directed learning. Adequate understanding of the relationships between self-directed learning and learning styles is requisite to effective identification of learning needs, and appropriate delivery and transactional materials and methods for facilitating learning how to learn.
Problem Statement

Although competences required for success and effectiveness in self-directed learning have been explored by many scholars (Knowles, 1975; Smith, 1982; Caffarella and Caffarella, 1986), no study has directly investigated the learning styles of adults with high propensity for self-directed learning.

Most studies have conceptualized self-directed learning as a method or mode with much less emphasis on individual predisposition and learning style preferences. Consequently, many of the proposals and recommendations concerning how to make self-directed learning more effective remain speculative, and limited. This is in part due to a general dearth of empirical tools and inherent weaknesses in the theoretical framework for self-directed learning research (Caffarella and O'Donnell, 1987). Professional and scientific knowledge about self-directed learning and measures of self-direction in learning are inadequate to make conclusive and prescriptive statements about types and levels of learning styles appropriate for self-directed learners.

Linking self-directed learning and personality characteristics and other relatively more stable traits of the individual would provide a more unified and comprehensive framework for the study of self-directed
learning (Oddi, 1987). In addition, conceptualization across traditions of research and theory building about adult learning can be enhanced.

While the literature suggests a confluence of conceptual propositions about the connectedness of learning style and self-direction in learning, empirical exploration of this potential is conspicuously lacking.

This study is designed to investigate whether there is a relationship between a person's readiness for self-directed learning and his/her learning style; and whether there is a predominant learning style among adult learners with high or low readiness for self-directed learning.

Objectives of the Study

The study attempts to identify relationships among learning styles and readiness for self-direction in learning; and selected demographic factors. The specific objectives include:

1. To identify the learning style preferences of graduate students enrolled at Iowa State University during Spring, 1989 using Kolb's (1985) experiential learning model categories.

2. To identify the respondents' readiness for self-direction in learning using Guglielmino's (1977) Self-directed learning readiness scale.
3. To compare the learning styles and self-directed learning readiness of the respondents across selected demographic variables (age, gender, nationality, academic majors, program of study, and prior work experience).

4. To investigate the relationship between learning styles and self-directed learning readiness of the respondents.

**Research Questions**

Many questions need to be addressed, particularly with regard to what factors contribute to self-direction in learning and preference for learning style types and strategies. Some pertinent research questions germane to the focus of this study include:

1. Is there a correlation of inner-outer directedness of subjects (as measured by the SDLRS) with learning orientation (as measured by each of the experiential learning dimensions--taking-in (abstract-concrete) and transforming (active-reflective)?

2. Which of the two learning dimensions (Abstract-Concrete and Active-Reflective) is more predictive of readiness for self-directed learning (SDLR)?

3. Is a significant proportion of the variance associated with subjects readiness for self-direction in learning (SDLR scores) explained more by one, or a
combination of learning orientations (learning style inventory scores—abstract-concrete, active-reflective)?

4. To what extent do demographic variables (age, gender, nationality, academic major, and prior work experience) explain readiness for self-directed learning?

Definition of Terms

Learning Style

Learning Style—refers to a person's preferred or constant way or mode of responding to stimuli in the context of learning (Holtzclaw, 1985). Learning style includes identifiable individual idiosyncrasies and preferences for receiving or perceiving and processing information in the context of learning. In this study, learning style is used synonymously with learning orientation.

Cognitive Styles

Cognitive styles are closely related to learning styles; They are fixed patterns for viewing the world (Bonham, 1988a). According to Smith (1982), they refer to the idiosyncratic ways learners process information.

Self-directed learning (SDL)

Self-directed learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating
learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes (Knowles, 1975).

Learning project

A learning project—"a major, highly deliberate effort to gain certain knowledge or skill" (Tough, 1971, p. 1). It may involve quite a range of activities, and may involve acquisition of knowledge/information, changes in skills, attitude or behavior.

Learning How To Learn

Learning How To Learn—According to Smith (1982), learning how to learn involves possessing, or acquiring, the knowledge and skill to learn effectively in any learning situation.

Self-directed learning readiness

Self-directed learning readiness—represents an adult's preparedness for self-directed learning. According to Hall-Johnsen (1985), it refers to the extent to which "an individual possesses preferences and attitudes towards learning (as estimated by SDLRS) that are necessary for self-directed learning". Eight factors identified by Guglielmino (1977), and supported by many later studies
include: 1) love of learning, 2) self-concept as an effective, independent learner, 3) tolerance of risk, ambiguity, and complexity in learning, 4) creativity, 5) view of learning as a lifelong, beneficial process, 6) initiative in learning, 7) self-understanding, and 8) acceptance of responsibility for one's own learning.

In this study, self-directed learning readiness and inner-outer directedness in learning are used interchangeably. Also, self-direction and inner-directedness in learning, are used synonymously.

Assumptions


2. Kolb's (1985) Learning Style Inventory is a valid instrument for assessing subjects preferences for learning abilities and learning styles.

3. The subjects will respond honestly to the questions contained in the questionnaires.

4. The subjects are able to effectively evaluate and report their perceptions about the questions asked.
Variables

The variables of the study include:

**Dependent variable**

1. Self-directed learning readiness (SDLR) as measured by the total score of subjects on the SDLR instrument (Guglielmino, 1977).

**Independent variables**

1. Learning orientation/style and learning style type as measured by Kolb's (1984) learning style inventory. The learning style inventory (LSI) measures the subject's preference for four learning modes or abilities—AC (abstract conceptualization), CE (concrete experience), AE (active experimentation) and RO (reflective observation) which underlie learning from experience. Learning style is a function of a combination of the four modes derived by subtracting concrete experience scores from abstract conceptualization scores (AC-CE) and reflective observation from active experimentation (AE-RO). The resulting scores represent the abstract-concrete and active-reflective dimensions/continua of learning. Four learning style types (diverger, converger, assimilator, and accommodator) are derived by locating individuals on a matrix combining the norm scores of the two learning dimensions (Figures 1 and 2).
(Taking in information) ------>

ACTIVE EXPERIMENTATION (AE) ------- REFLECTIVE OBSERVATION (RO)

(Taking in information)

ABSTRACT CONCEPTUALIZATION (AC)

Figure 1. Matrix of learning style dimensions

Percentiles

| 0- | 10- | 20- | 30- | 40- |
| 25 |

AC-CE >

| 60- | 70- | 80- | 90- |
| 75 |

Accommodator Diverger

Converger Assimilator

Figure 2. Learning-style type grid (Kolb, 1985)
2. Demographics - age, gender, nationality, academic major, degree program, and prior work experience. Justification for including these demographic variables are as follows: Dorsey and Pierson's (1984) findings reveal that age and prior work experience influence the preferred learning style more than gender and ethnicity. Based on Witkin's (1969), field articulation theory, Brookfield (1985) describes the field-independent learners' characteristics as "analytical, socially independent, inner-directed, individualistic" (emphasis mine), and suggested that "such learners are presumed to be found in open democratic societies which emphasize self-control and autonomy" (p. 8). Making reference to Pratt (1984), he indicated that in contrast, field-dependent individuals are less self-directed in their learning with preference for more structure and guidance from an external source. Pratt (1984) further speculated that individuals with tendencies intermediate between field-dependent and field-independent, indicating a balance of qualities, may be are the "best suited to collaborative education" (p. 151).

Following from the above expositions and suggestions, nationality seems to be a more relevant variable than ethnicity. Also, the sample size required to address the question of ethnic variability will be outside the scope of this study.
Although age and prior work experience were reported to affect learning style preference more than gender and ethnicity (Dorsey and Pierson, 1984), gender is included in this study because it allows comparison with previous studies for validity interests.

Other factors that have been studied in relation to learning styles include: Educational specialization, professional career, current job, teaching styles, and psychological types. However, the only other variables included in this study are academic major and program of study. Educational level is controlled for by limiting the study to graduate students who are considered to have a fairly homogeneous and comparable level of formal education.

Hypotheses of the Study

In order to effectively address the research questions and objectives of the study, the following research hypotheses will be examined.

Conjectures related to research questions 1 and 2

1. If self-directed learners are individuals who actively experiment with their environment through concrete self-initiated, self-managed learning projects, then individuals with relative preference for active experimentation, regardless of the way they take in
information, will be more ready for self-directed learning than those with preference for reflective observation.

\( H_1: \) The transformation dimension (AE-RO scores) will be significantly \((P < .05)\) more predictive of readiness for self-directed learning (SDLRS scores) than the prehension or taking-in of information dimension (AC-CE scores).

**Rationale for hypothesis 1** According to Knowles' (1975) definition, involvement in self-directed learning requires individuals to take initiative, with or without the help of others, and be actively involved in the entire process of planning, implementing and evaluating the learning effort. Also, literature on self-directed learning indicates that practice ranks highest (above reading and discussion) as the most commonly used methods in self-directed learning projects (Coolican, 1974, 1975). Inner-directed individuals (with high SDLR) carry out more self-directed learning projects (Hassan, 1981; Hall-Johnsen, 1985). This seems to suggest appreciable inclination toward Active Experimentation and Concrete Experience. Therefore, it would be consistent with the foregoing expositions to expect that individuals with preference for an active experimentation learning mode will be more likely to get involved in carrying out more self-
directed learning projects using practical methods. In addition, it has been implied from cognitive style literature that field-independent learners are less socially dependent, prefer less structure, and are more self-directed, in learning than field-dependent learners (Brookfield, 1985). Field-independent and field-dependent cognitive styles have been considered analogous to Kolb's accommodator and assimilator learning style types (Cunningham, 1983).

2. If the transformation (of experience) dimension is more indicative of readiness for self-direction in learning than the prehension (taking-in of information) dimension, as learners combine active experimentation with concrete experience or abstract conceptualization learning modes, they increase their readiness for self-directed learning.

H₂: Individuals with preference for each of the Accommodator and Converger style types will be significantly (P < .05) more ready for self-directed learning than those with preference for the Assimilator and Diverger style types.

Rationale for hypothesis 2 Hypothesis 2 is a logical extension or derivative of hypothesis 1 and essentially represents an attempt to reformulate the logical implications of aspects of hypothesis 1 using Kolb's (1985) learning style types or categories. The
above descriptions of the self-directed learner are consistent with Kolb's description of the characteristics of accommodators (doing things, action-oriented with active experimentation and concrete experience as dominant learning abilities. Also, convergers prefer practical application and like to deal with things (Kolb, 1984). Thus it is reasonable to expect that individuals who actively experiment with their environments in a concrete manner will prefer the accommodator style type—a combination of active experimentation and concrete experience learning modes or abilities. Those who like to make abstractions from, and actively experiment with their environment will prefer the converger style—a combination of active experimentation and abstract conceptualization. Therefore, persons who prefer either of these two styles will be more ready for self-directed learning than assimilators who combine abstract conceptualization and reflective observation, and divergers who combine concrete experience with reflective observation.

If the transformation (of experience) dimension is more indicative of readiness for self-direction in learning than the prehension (taking-in of information) dimension, then active experimentation and practicality or concrete experience seem more logically consistent with the characteristics of self-directed learners described
earlier. Therefore, regardless of mode of prehension, individuals with a preference for an active transformation ability or mode will be more ready for self-directed learning than those with preference for a reflective transformation mode.

**Conjecture related to research question 3**

Demographic variables are more important in shaping an individual's learning style preference than in shaping his/her readiness for self-directed learning. The resulting learning style exerts a more direct influence in determining the degree to which an individual is ready for self-directed learning than the direct or indirect effects of the demographic variables. Two hypotheses—3 and 4 address this conjecture.

\[ H_3: \] The demographic variables (age, gender, nationality, academic majors, and prior work experience) will have a significant (\( P < .05 \)) indirect association (through the learning style inventory scores) with the SDLRS scores.

**Rationale for Hypothesis 3** Past research indicates that level of formal education is the only demographic variable that is significantly associated with readiness for self-directed learning (Sabbaghian, 1979; Hassan, 1981; Brockett, 1983). Hassan (1981) reported
that "sex, age, race, marital status, number of children under 19, and occupation do not have any significant impact on the adults' readiness for self-direction in learning" (p. 178). Also Hall-Johnsen (1985) reported that readiness for self-directed learning "did not differ with respect to gender, full versus part-time employment, program area, level of professional position, academic degrees beyond a bachelor's degree or tenure" (p. 130).

On the other hand learning style research indicates that demographic variables such as age, gender, occupation, academic major, personality type, educational level, prior work experience (Kolb, 1976, 1984; Dorsey and Pierson, 1984), either singly or in combination have significant correlations to the individual's learning style.

It would seem logical therefore to hypothesize that demographic variables are more important in shaping an individual's learning style preference than in shaping his/her readiness for self-directed learning. And that the resulting learning style exerts a more direct influence on the degree to which an individual is ready for self directed learning.

Hypothesis 3 is put forward to further clarify this proposition and also examine whether demographic variables alone are predictive of readiness for self-directed learning or if learning style inventory scores provides
additional information toward such prediction. That is, what is the contribution of the learning style inventory scores beyond the demographic variables? This should further clarify the role of demographic variables in the hypothesized relationship between learning style preference and self-direction in learning. Figure 3 summarizes the relationships hypothesized.

Although the demographic variables are of secondary interest to this study, nationality is given additional attention as reflected by research hypothesis 4 in order to provide insights on socio-cultural and cross-national influences.

\[ H_4: \text{After nationality and program of study are accounted for, none of the demographic variables will contribute significantly (} P < .05) \text{ to the variance associated with subjects readiness for self-directed learning (SDLR scores).} \]

**Rationale for Hypothesis 4**

Cross-cultural generalizations and comparisons have been a major limitation of self-directed learning research (Tough, 1978; Brookfield, 1985). Studies that are designed to allow comparisons across national and cultural backgrounds are needed to improve generalizability of findings and alleviate current limitations.
Figure 3. Model of relationships (theoretical) among demographic variables and learning style on SDLR.
As stated earlier, Brookfield (1985) inferred from the analogous field articulation research literature, that field-independent learners are self-directed and individualistic. He further suggested that "such learners are presumed to be found in open democratic societies which emphasize self-control and autonomy" (p. 8). Making reference to Pratt (1984), he also indicated that in contrast, field-dependent individuals are less self-directed in their learning and more prevalent in cultures with emphasis on "role definition, social control and respect for authority" (p. 8).

Although not directly empirically based, the above would seem to suggest that socio-cultural, national and societal influences may each play an important role in approaches of the individual to learning and preference for structure.

A conceptual model presented in Figure 3 summarizes and synthesizes the relationships hypothesized in this study. The model posits direct and indirect (through learning orientation) influences of demographic variables on an individuals' readiness for self-directed learning.
Significance of the Study

The study will add to the literature and body of knowledge related to two traditions of experience-based learning (self-directed learning and learning styles) research. It should also help promote both conceptual and empirical integration and linkages between the two traditions of adult learning.

The findings of the study will improve knowledge about the role of preferences for learning style types and learning abilities in readiness of adult learners for self-directed learning.

An understanding of the relationship between self-directed learning and learning style could provide a reliable basis for formulating and developing specialized learning strategies/packages that will take cognizance of the type of learner (in terms of predisposed locus of control, and degree of self-direction in learning) and appropriate learning styles. On the basis of the ability to discriminate between inner-directed and outer-directed learners and knowledge about optimum learning-teaching styles, adult educators can better determine how to incorporate a learner's particularities into educational programming.
Limitations

1. Graduate students of Iowa State University (American and non-Americans) registered for both full-time and part-time programs for the 1988/89 school year constituted the population from which the sample for the study was drawn. This population was selected because of the following considerations: homogeneity of educational attainment, cost, accessibility, and time. Therefore the findings of the study are limited to this population and may not ordinarily be generalized to other adults learners.

2. Also since self-reporting instruments were utilized in collecting the data for the study, the results do not represent actual or overt behavior (except by inference).

3. The extent to which inference about actual behavior can be attempted is limited by the effectiveness and correlation of the above-mentioned self-reporting instruments to actual behavior.

4. The possible effects of interaction among SDLR, learning style inventory, and demographic variables on the main effects was not included in the analysis of the results of this study.
CHAPTER 2

LITERATURE REVIEW

Overview

This chapter is focused on a review of selected literature pertaining to theory and research about experiential and self-directed adult learning. The review includes theory building efforts and the semantic dilemmas inherent in the delimitation and conceptualization of factors and processes involved in adult learning. Alluding briefly to the central tenets of andragogy, the first part of the chapter provides a background for conceptualizing the role of experience and self-concept in an adult's readiness and motivation to learn. Following this is a discussion of research and theory about adult learning, namely, experiential learning, and self-directed learning; including a further conceptual exploration of their relationship. A selection of research studies specifically focused on adult readiness for self-directed learning, and/or learning styles (as conceptualized by Guglielmino 1977, and Kolb, 1976, respectively) was examined and discussed.

The review of the literature is concluded with an analysis of some past conceptual and empirical attempts to
synthesize learning styles and self-directedness; and the relevance of such efforts to the present study.

Research and theory-building in adult education

Learning can be defined or conceptualized as a process, a product (outcome), or as a function, and this affects perceptions of it. Because of the multidimensionality of adult learning, research and theory building efforts have taken diverse forms (Knowles, 1970; McClusky, 1970; Mezirow, 1981; Hebron, 1983; Cross, 1984; Wilson, 1984). Each tradition or area of research employs a different emphasis in delimiting the phenomenon of adult learning. Even attempts to classify and interpret these diverse efforts have been less than concordant. Hebron (1983), identified major limitations to such attempts to include the dissimilarity in the definition of learning by the researchers and learners; and also in the "foci of attention", aims, perspectives and methodologies of investigation (p. 447). Also the polemic of operationalizing the term 'adult' further complicates this process.

Merriam (1987) categorized a selection of these theory-building efforts into three main types: 1. those that are based on adult learner characteristics (e.g., Cross, 1984); 2. those based on adult's life situation
androgogy. She suggested that "the best known 'theory' of adult learning is andragogy" and that while it remains uncertain that a universally acceptable theory of adult learning will evolve, each stream of thought is contributory to understanding adult learning (p. 189).

Andragogy

The broad conceptual framework for this study is hinged upon three interrelated, complementary and somewhat overlapping theory bases -- andragogy, experiential learning, and self-directed learning. Deriving from these, are the more specific constructs of self-directed learning readiness and learning styles. Andragogy undergirds the theoretical premises of self-directed learning and also intersects significantly with experiential learning, both of which circumscribe the specific constructs examined by this study. A brief discussion of andragogy is therefore pertinent to provide the necessary background for conceptualizing the variables and constructs of the study.

Andragogy was developed and defined by Knowles (1970, 1975) as the art and science of facilitating adult
learning. Although opposite in meaning to pedagogy—the art and science of teaching children, there has been much controversy about the tenability of such a dichotomy (London, 1973; McKenzie, 1977; Davenport and Davenport, 1985a). Contemporary thinking seems to be that the two terms represent the polar ends of a continuum of human didactics applicable to both adults and children alike, depending on the context of learning. In the context of this study, andragogy is not regarded as a theory of adult learning per se, but as a set of parameters or postulates useful in directing thinking and theorizing about experiential and self-directed adult learning.

The basic tenets of andragogy are rooted in the following four assumptions about the adult learner:

1. As a person grows and matures his or her self-concept moves from dependency to one of increasing self-directedness;

2. An adult accumulates a growing reservoir of experience which becomes a rich resource for learning;

3. An adult's readiness to learn is closely related to the developmental tasks of his or her social role; and

4. As an individual matures, there is a change in time perspective from deferred application to immediacy of application; and therefore an adult is more problem-oriented than subject-oriented in learning (pp. 55-59).

Knowles emphasizes the importance of evolving social roles and attendant developmental tasks in an adult's
readiness to learn. This, in turn, may affect the way such a learner would prefer to approach a learning experience. Knowles' andragogy incorporates many of the philosophies and earlier theorizing about adult education, including progressive education, human development, and humanistic psychology (Knowles, 1970; Davenport, 1987). Consistent with the above four assumptions, Knowles (1975, pp. 34-37) identified seven considerations requisite to effective facilitation of adult learning to include: climate setting, planning, diagnosing needs for learning, setting goals, designing a learning plan, engaging in learning activities, and evaluating learning outcomes. These seven steps are to be operationalized in mutual collaboration with the adult learner in an experiential manner. Although not directly empirically based, andragogy provides important guides for facilitating adult learning. In addition, many studies have, to varying degrees, provided positive evidence that directly or indirectly support these assumptions about the roles of experience, self-direction/self-concept, readiness to learn and problem-centeredness in adult learning. For instance, self-directed learning research has unveiled considerable information about involvement of adults in self-directed learning projects (Tough, 1971, 1978; Coolican, 1974, 1975; Baghi, 1979, Brockett, 1983); and readiness for self-
directed learning (Guglielmino, 1977; Mourad and Torrance, 1979; Oddi, 1986).

**Experiential learning**

Both early and contemporary adult educators and scholars recognize and stress the role of experience, life situations, adults' needs for self-direction, and individual differences in style, time, place and pace of learning (Lindeman, 1926; Dewey, 1938; Knowles, 1970; Tumin, 1976; Marienau and Chickering, 1982; Jarvis, 1987). The roles of self-direction and experience in learning have thus come to be highly valued in adult education.

However, experience is neither equivalent to, nor does it unconditionally result in, learning (Dewey, 1938; Jarvis, 1987). In order to constitute learning, experience must be processed or transformed. The literature provides a gamut of approaches for conceptualizing the steps and processes involved in this transformation (Freire, 1970; Knowles, 1970; Kolb, 1976, 1984; Mezirow, 1981, 1985; Wilson, 1984; Jarvis, 1987). To be alive is to be potentially vulnerable or accessible to Life experiences which abound in the individual's life-space or psychosocial environment, and this provides the basis for experiential learning. And because we necessarily live in interaction with other people, and a very dynamic world,
these experiences occur in differing contexts with equally
diverse implications and significance for learning.
According to Jarvis (1987), learning from experience
depends upon the dynamics of the transaction between the
individual and this "socio-cultural-temporal mileu"
(p. 171).

Because experience constitutes a potential for
learning, and because of the complexity of context and
content, many educators agree that learning can no longer
be limited to traditional schooling. The concept of
experiential learning is an off-shoot of professional
desires and efforts of educators to better articulate the
lifelong nature of learning, to include and recognize
learning experiences outside schools and traditional
institutions. Experiential learning advocates seek to
reevaluate, redefine and integrate the relationship among
learning, leisure, work and school. As Cunningham (1983)
puts it, "experiential learning is seen as a possible
response to pressures for change in the educational system
brought about by a number of social forces...and the
changing nature of work" (p. 58).

Experiential learning has been variously defined and
conceptualized. Keeton and Tate (1978) defined
experiential learning as learning "in which the learner is
directly in touch with the realities being studied" (p. 2).
They distinguished between two classifications, namely "collegiate" versus "non-collegiate"; and "sponsored" versus nonsponsored" experiential learning. They indicated that the majority of experiential learning is in the non-collegiate category. These take place mainly in nonacademic institutions and include self-directed learning.

Also Brown (1980) classified experiential learning based on instructional orientation into: Type 1—"How to" experiential learning which is subject-centered; Type 2—"Role socialization" experiential learning, in which the objective is focused on professional role; Type 3—"Learner managed" experiential learning which is oriented toward autonomous use of experience for learning (learning how to learn). Citing Tough (1971) and Knowles (1975) as the relevant learning theorists of Type 3 experiential learning, he suggested that "traditional" school system is "generally ill-equipped to design, conduct or evaluate" this type of experiential learning (p. 53).

Similarly, Cunningham (1983) identified three groups of experiential learning advocates and approaches to include:

1. Those who seek to substitute or complement traditional instruction and therefore emphasize the identification of an acceptable procedure for identifying,
evaluating and assigning formal credit to learning from everyday experience.

2. The second group of advocates views learning as a lifelong process based on experience and seeks to facilitate adult learning in the collaborative and self-directed modes in a manner consistent with andragogical principles.

3. The third group he called "empowerment educators" who are interested in experience and its relationship to learning, including the socio-political, cultural and epistemological contexts and implications. This group focuses on change in consciousness relative to constructing meaning, and contend that concrete life experiences should be the starting point for schooling.

In short, approaches and conceptions of experiential learning range from one extreme of those who attempt to translate and integrate work, leisure and other life experiences into traditional school certification mechanisms; to the other extreme group who contend that schooling should be coterminous with life experiences and the attendant socio-political and ethnographic realities of the individuals. Equally variegated are the approaches to operationalizing and explicating experiential learning. As evidenced by following sections of this chapter, and later chapters, this study is not about credentialing of
experience or leisure, but is focused on conceptualizing adult experiential self-directed learning based on the Dewey, Lewin, and Kolb tradition of experiential learning. Consequently the focus of the investigation has a somewhat different twist than the formal school approaches to conceptualizing experiential learning.

Self-directed Learning (SDL) Research and Perspectives

Research in SDL has helped to redefine the conceptual boundaries of adult learning; and substantiated that many adults conduct self-directed learning projects. Thus the notion that adult learning can only occur in the presence of a fully accredited and certificated professional is seriously challenged (Brookfield, 1984). In addition, individuals vary a great deal in the way they approach learning, and attempts have been made to identify, understand and develop measures of these dimensions of adult learning (Tough, 1971; Guglielmino, 1977; Knowles, 1975; Kolb, 1976; Houle, 1988).

Various aspects of SDL have been explored for relationships with different demographic and personality variables in the quest to broaden our conceptualization of adult learning and upgrade our ability to predict, identify and match individual predispositions with appropriate teaching strategies for increased effectiveness.
Caffarella and O'Donnell (1987) classified SDL research into:

- verification studies (learning projects);
- nature of method of SDL (focusing on how questions);
- nature of the individual learner (who and what questions);
- nature of philosophical position (perspectives on the process);
- and policy questions (roles of educators, institutions, and society).

In epitomizing a variety of studies on SDL, Cross (1984) concluded that there is sufficiently supportive consensus among various studies to make the following generalizations:

1) Participation in self-directed learning is almost universal; reports from studies show that from 79% (Penland, 1977) to 100% (Coolican, 1974, 1975) of all adults carry out at least one learning project in a year.

2) Typically, an adult spends about 100 hours on each project and conducts about 5 projects per year for a total of 500 hours per year (Tough, 1978).

3) The possible range of subject-matter is infinite but in general, self-directed learning projects deal with vocational or job-related subjects; home and family; and hobbies and recreation; in that order.

4) About 75% of the learning projects are completely self-directed; about 10% are one-to-one learning
situations, 3% use completely pre-programmed, non-human resources (tapes, programmed instruction and television). Only 20% of all learning projects are planned by a paid, or institutionally designated professional (Tough, 1978).

5) The three methods most commonly used in learning projects are practice, reading and discussion, in that order (Coolican, 1974, 1975). Cross-cultural generalization is a major concern in SDL studies because there are not many studies about learners in developing countries. However, Denys, 1973, (cited in Baghi, 1979) studied the learning efforts of 40 randomly selected professionals in Ghana, and found that 75% of the learning projects were self-planned. This contrasts sharply with Field's (1977) who studied learning efforts of 85 adults of low literacy in Jamaica and found that 20% of the projects were self-planned. More cross-cultural and intra-cultural studies are advocated (Tough, 1978; Brookfield, 1985).

Control of major decisions about learning efforts is central to conceptualizing self-directed learning; and much research effort has been geared toward the measurement and definition of self-directedness. This has, however, been limited by a dearth of valid and reliable instruments. Different methods and approaches are available for estimating locus of control and inner-outer directedness of individuals, but one particularly relevant to this study is
the Self-directed Learning Readiness Scale (SDLRS) developed by Guglielmino (1977), discussed in the following section.

Self-directed learning readiness

The SDLRS was specifically developed to estimate an individual's inner-outer directedness in the context of learning. This specific context and its adult-orientation makes it particularly appropriate for this study.

Guglielmino (1977) identified eight factors which define attitudes, values, and abilities of adult learners associated with readiness for self-directed learning. These factors include: 1) love of learning, 2) self-concept as an effective, independent learner, 3) tolerance of risk, ambiguity, and complexity in learning, 4) creativity, 5) view of learning as a lifelong beneficial process, 6) initiative in learning, 7) self-understanding, and 8) acceptance of responsibility for one's own learning. These factors form the basis of the self-directed learning readiness scale (SDLRS). The SDLRS was designed to estimate an individual's preparedness or readiness for self-directed learning. The range of the total score on this scale represents an inner-outer directedness continuum along which an individual's readiness for self-direction in learning can be located. According to Hall-Johsen (1985),
the self-directed learning readiness scale estimates the extent to which an individual "possesses preferences and attitudes towards learning that are necessary for self-directed learning"

The development and validation of the Self-Directed Learning Readiness Scale (SDLRS) by Guglielmino (1977), has greatly facilitated the identification and study of personal characteristics of learners related to self-direction in learning. Following is an analysis and discussion of studies that have examined the relationships of inner-outer directedness of adult learners as construed by Guglielmino (1977) to demographic and personal factors, learning behaviors, and instructional strategies designed to enhance self-directedness in learning.

**Inner-Outer Directedness Research**

Significant relationships have been found between SDLRS and the following: style of thinking and creativity (Torrance and Mourad 1978); self-concept (Sabbaghian 1979); dogmatism (Long and Agyekum 1983); the number of SDL projects conducted (Hassan, 1981; Hall-Johsen, 1985); the number of hours on learning projects (Sabbaghian, 1979); the internal locus of control (Skaggs, 1981); and formal education (Sabbaghian, 1979; Hassan, 1981; and Brockett, 1983).
Using Guglielmino's self-directed learning readiness (SDLR) instrument, Smith (1989) investigated the relationship between self-directed learning readiness and success of participants in a "highly self-directed, non-traditional" higher education degree (Bachelor of Liberal Studies) program. A sample of 75 individuals including 45 recent graduates and 30 individuals who withdrew from the program, was studied to test the hypothesis that those who graduated were more ready for the self-directed nature of the program than those who withdrew. According to the researcher, the results of a Pearson correlation analysis lends support to this hypothesis. Also, a Student t-test analysis revealed a significant difference (p < .01) in the mean SDLRS scores of the two groups. Smith concluded that the Bachelor of Liberal Studies program seems to be self-selective, and suggested that the SDLRS has a potential as an indicator of student success, and as a counseling tool for participants in this program.

Kasworm (1983) explored the impact of a three-credit semester hour graduate course based on Knowles' (1977) learning contract and competences for self-directed learning on two groups of students enrolled in 1980 (n = 19) and 1981 (n = 14) semesters. Impact of the learning contract course on awareness, knowledge and skill in self-directed learning was assessed using Guglielmino's
(1977) self-directed learning readiness (SDLR) instrument, course evaluation, and observational diaries (kept by the facilitator and two selected students in each of the courses). T-test analyses of gain scores derived from pre- and post-test scores of SDLRS revealed significant "positive growth of self-directed learning behavior" for subjects in both the 1980 ($t = 7.45$, $p < .001$; $df = 18$) and 1981 ($t = 1.97$, $p < .05$; $df = 13$) courses. Some of the subjects however, had a negative gain score. Combining the positive support from the class evaluation and content analysis of the observational diaries, Kasworm concluded that "a self-directed contract learning course can influence the majority of participants in their development of self-directed learning attitudes and behaviors" (p. 53) and noted that 75% of the respondents were significantly enthusiastic and satisfied with the course. Finally she acknowledged the small number of subjects in the study, and absence of a control group as limitations of the findings.

Caffarella and Caffarella (1986) in a similar study, investigated the influence of the use of a learning contract format on students' readiness and competences for self-directed learning using a pretest-treatment-posttest design and reached a contrasting conclusion. They developed a Self-Directed Learning Competences Self Appraisal Form (SDLCSAF) and administered it along with
Guglielmino's SDLRS to 163 students from six universities in the United States. Student t-test analyses failed to detect any statistically significant change in subjects SDLRS pre- and post-test scores in general, and by course content, previous adult education coursework, prior experience with learning contracts, age, and student graduate program categories. Reporting that only three out of the twelve competences measured by the SDLCSAF increased significantly, they questioned the validity of claims and comments of many adult educators that learning contracts foster self-directedness. They concluded that the "learning contract should not be viewed as a major tool for the enhancement of the skills and competences of self-directed learning" (p. 233) in graduate level adult education.

Learning Styles Research and Perspectives

Approaches to research and theory about Learning style vary greatly, both in number and context. Although the distinction between cognitive style and learning style remains vague, and controversial, important conceptual and practical linkages can be detected across both traditions. The literature in general would seem to suggest that an individual's learning style circumscribes cognitive, affective and psychological--physiological and/or
environmental factors (Smith, 1982; Cornett, 1983).

Dunn and Dunn (1978) described the basic elements of learning styles as including: environmental (sound, light, temperature, design); emotional (motivation, persistence, responsibility, structure); sociological (peers, self, pair, team, adult, varied) and physical (perceptual, intake, time, mobility).

Research studies and reports about learning styles have focused on different aspects—cognitive (Kolb, 1976; Kirby, 1979); affective (Messick 1976), and psychological (Dunn and Price, 1978). Each approach emphasizes different aspects while some are eclectic or multidimensional.

The cognitive aspects include the way individuals decode, process and retrieve information (e.g., focusing/scanning, random/sequential, concrete/abstract field-dependence/field-independence). Affective aspects include emotional and personality characteristics such as motivation, attention, locus of control, preference for structure, persistence, responsibility and sociability. Psychological aspects include sensory perception (visual, auditory, kinesthetic, taste and smell), environmental characteristics (noise level, light, temperature, room arrangement), need for food during study, and time of day for optimum learning (Cornett, 1983).
Kolb's (1976, 1984) model of experiential learning is adopted for this study because of its adult-orientation and context. It has been suggested to be more appropriate and relevant to adult learners and to have a relatively sound and well-defined theory base—experiential learning (Bonham, 1988a). According to Kolb (1984) the model attempts to combine and integrate experience, perception, cognition, and behavior.

Kolb (1984) defines learning as "a process whereby knowledge is created through the transformation of experience" (p. 38). He traces the intellectual origins of experiential learning in the works of Dewey, Lewin and Piaget; and identifies six characteristics of Experiential learning as follows:

1. Learning is best conceived as a process rather than in terms of outcomes.
2. Learning is a continuous process grounded in experience.
3. The process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.
4. Learning is a holistic process of adaptation to the world.
5. Learning involves transactions between the individual and the environment.
6. Learning is the process of creating knowledge.

His model describes experiential learning as a four-stage cyclic process involving four adaptive learning
modes—Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). For example, the cycle could start with: (a) experiencing (concrete experience); (b) the experience is "observed and reflected" (Reflective Observation) upon; (c) the experience is "abstracted, conceptualized and generalized" (Abstract Conceptualization); and (d) the "generalization is tested" in a new experience (active experimentation).

While these four adaptive modes are basic to the experiential learning cycle, individuals vary in their relative emphasis on, or preference for, each of them. In this model, AC-CE and AE-RO are two distinct dimensions or continua—abstract-concrete and active-reflective respectively. Each represents two dialectically opposed adaptive orientations fundamental to the learning processes. The AC-CE dimension describes the preferred mode of prehension or (taking-in information or experience), while the AE-RO dimension is the transformation dimension and describes the mode of transformation of information or experience. The transaction among the four learning modes and the resolution or transformation of the adaptive dialectics provide the structural basis of the learning process and
Kolb's learning style types (converger, assimilator, diverger, and accommodator).

Learning Styles Research

Learning styles have been studied in relation to occupation, age, ethnic background, gender, work experience (Dorsey and Pierson, 1984). Dorsey and Pierson (1984) studied learning styles of adult students enrolled in off-campus classes at Texas State University who were pursuing non-traditional undergraduate degree programs in occupational education (n = 513). Their results show that age has a curvilinear relationship with learning style. They found that preference for AC-CE dimension tended toward abstractness from ages 18-33 and more concrete from ages 34-49. Preference for the active-reflective (AE-RO) dimension suggested more orientation toward active experimentation from age 18-49, toward more reflectivity beyond age 49. This is consistent with results of Kolb's (1976) study which also established a curvilinear relationship of learning style to age.

Andersen and Bell-Daquilante (1980) explored the relationships among learning style preferences and communication behaviors and predispositions of a random sample (n = 423) of high school students who enrolled in English classes from 10 high schools in Harrison county, West Virginia. Based on the logic that communication is
intrinsic to learning, they suggested that communication variables may be indicative of learning style preferences or orientation. Findings based on Canonical correlation, Multiple Regression and Multiple discriminant analysis of measures of Communication Predisposition (Communication Apprehension, Shyness, Unwillingness to Communicate, and Tolerance for Disagreement); and measures of reported communication behaviors (Immediacy, Communicator Style, Learning Style Preference) in general, seem to support their suggestion of "a potential underlying relationship" (p. 9) between communication and learning style. Communication variables seem most important in predicting active experimentation, reflective observation, active participation and active/passive orientation. Also, their results show that 61% of the cases can be correctly classified into one of the LSI categories based on a linear composite of communication behaviors and predispositions.

McCart et al. (1985) investigated learning styles and instructional preferences in a random sample (n = 148) of established Pennsylvania practitioners in the licensed and certified professions (accounting, architecture, clinical dietetics, and nursing). Using analysis of variance techniques, they demonstrated that the four groups of practitioners differ significantly (F = 5.04, p < .01) in their preference for learning styles based on Kolb's (1976)
types. Accountants and dietitians preferred an accommodator style while nurses and architects preferred diverger style type. Four instructional methods -- small group sessions, workshops, demonstrations, and self-study (out of eight options) ranked top for the entire sample as a whole. However, there was considerable variability among the groups in ranking these four methods. For instance small group sessions was selected as the most preferred by 78% of Accountants and 79% of Clinical Dietitians; workshops by 65% of Nurses and 55% of Architects. McCart et al. (1985) contrasted their findings with prior studies and expectation/predictions from experiential learning theory. They concluded that "The Learning Style Inventory may have some utility with groups of mature practitioners in selected professions".

Wilkerson (1986) examined the relationship between learning style preference and clinical achievement of a sample (n = 133) of basic baccalaureate nursing students enrolled in a theory/practicum course of the junior year in an integrated curriculum. Using Kolb's experiential learning model, hypotheses relating differences in achievement on outcome measures (quizzes and clinical process papers) as a function of learning style preference of respondents were tested. Findings of the study indicate that all outcome measures are negatively correlated to the
the RO subscale, and positively correlated to the AC subscale. Also, the nursing students in general scored low on the RO dimension which was construed by the researcher to indicate "less preference for discrimination learning, as Kolb suggests, than for association learning, concept learning and problem-solving" (p. 224). Based on ANOVA results it was concluded that there are significant differences in respondents' mean scores on the different outcome measures of achievement by learning style preference. Further, there is a significant difference of respondents by learning style preference subscales (RO and AC).

Based on an inventory of characteristics and abilities expected of County Extension Agents' roles derived from literature (risk-taker, experimenter, adaptable), Pigg, Busch and Lacy (1980) hypothesized that Kolb's accommodator style type will be the most prevalent learning style among individuals in this role. To evaluate this hypothesis, they surveyed 349 county Cooperative Extension Agents in Kentucky for their preference for Kolb's Learning Style types. The hypothesis was supported with 44% (n = 327) of the respondents indicating preference for the accommodator style type. The proportions of subjects who reported preference for an accommodator style type were 37%, 46%, and 51% for the program areas - Agriculture (n = 112), Home
Economics (n = 110), 4-H-Youth (n = 105), respectively. They further investigated the relationship of preferred learning style to rating/ranking of selected educational techniques. Reporting that a very weak correlation was indicated by their findings, they suggested that the Learning Style Inventory, although very useful in identifying learning style preferences, should not be applied mechanistically in the design of instruction for adult learners. Additional, auxiliary information about a learner's preference for instructional techniques is deemed necessary and contributory to identifying appropriate instructional strategies and experiences.

Research Relating Self-directedness with Learning Styles

Not many research studies have been reported in the literature relating self-directedness and learning styles as conceptualized by Guglielmino (1977) and Kolb (1984) respectively. However, examples of conceptual and quasi-empirical attempts can be found. For instance, Brookfield (1984) attempted a conceptual exploration of the learning styles associated with Self-directedness from a cognitive perspective. By analogy, he made inferences based on Field articulation research literature to suggest that self-directed learners will tend to exhibit a preference for field independent learning style than other-directed
individuals who presumably will be more field-dependent. This is also consistent with Carney's (1985) contention that:

"Because Field dependent students seem to have a greater need for externally provided analytical structure than field independent students, it is expected that gifted students who are successful in self-directed independent studies will be field independent and those who are not successful in this learning approach will be field dependent" (p. 9). 

Carney (1985) put this contention to test by conducting a study into the relationship of self-directed learning abilities (as measured by a combination of Guglielmino's SDLRS score and teacher assessment), to psychological variables -- cognitive styles (field independence vs. field dependence as measured by the Group Embedded Figures Test), modality characteristics (visual, auditory or kinesthetic as measured by the Swassing-Barbe Modality Index) and instructional preferences (among nine categories) of intellectually gifted students in the 5th-8th grades (n = 78) participating in programs utilizing a self-directed, independent study approach. Student t-test analysis indicate a significant difference (t = 2.79, p = .01, n = 78) in cognitive styles preferred by students in
the self-directed learning \((n = 40)\) and non-self-directed \((n = 38)\) groups. In general, no statistically significant difference was found in the modality characteristics of the two groups, but a higher mean percentage score was noted for the non-self-directed group's preference for auditory modality. Correlation analyses of relationships between the field independence-field dependence cognitive style continuum and preference for nine instructional techniques was only weakly significant for "peer teaching" \((r = .235, p = .05)\) and "discussion" \((r = .236, p = .05)\). Also auditory modality correlated negatively with four instructional preferences — peer teaching \((r = .361)\), discussion \((r = .334)\), simulation \((r = .315)\), and programmed instruction \((r = .340)\) at the .01 level of significance. She concluded that students who share similar levels of intelligence and achievements vary in self-directed learning abilities. An additional conclusion was that significant differences exist in cognitive style, and modality characteristics and instructional preferences of students who are self-directed and those who are not. Her findings also suggest that students "who were highly successful in self-directed learning activities were more field independent than students who have difficulty being self-directed" (p. 77). This is consistent with expectations from field articulation research literature,
but the positive correlation of the cognitive style continuum with peer teaching and discussion methods are less so.

Theil (1984) investigated the learning styles (based on a French version of Kolb's 1980 Adaptive Style Inventory) of 30 French-speaking individuals considered to be successful self-directed learners (using Brookfield's 1981, criteria). Using Kolb's learning style types, he found the majority (53.3%) of his subjects to prefer the accommodator style type. The assimilator style was preferred by 26.7%, converger style, by 13.3%, and diverger style by only 6.7%. This pattern was found in general across demographic variables. That the majority of the successful self-directed learners were found to prefer the accommodator learning style seems consistent, as Theil puts it, with "pragmatic orientation" and other characteristics of highly self-directed learners commonly reported in the literature about adult learning.

Another study not directly based on Kolb's model, but germane to this literature review is that of Loesch and Foley (1988) which focused on learning preference -- preference for learning situations rather than learning orientations or modes. Administering the Learning Style Inventory (LPI) authored by Rezler and French 1975, to 63 adults, Loesch and Foley (1988) sought to compare
traditional baccalaureate curriculum and non-traditional, competence-based program students' preferences for Abstract and Concrete, Individual and Interpersonal, Student-structured and Teacher-structured learning situations, and the relationship between program choice and learning preference. Student t-test results show that the traditional students (n = 26) prefered Teacher-structured learning situations (t = 3.36, p < .05) while the non-traditional students (n = 37) preferred student-structured learning tasks (t = 2.44, p < .05). Loesch and Foley (1988) concluded from the results of a Pearson-moment correlation analysis that students with high Student-structured scores require less direction from the instructor and desire less concrete learning situations, and that students who preferred teacher-structured situations also prefer more concrete learning tasks. They also suggested that identifying the learning preferences could help the non-traditional students and their advisors select courses and explore learning options, and that "the LPI scores could be used in the admissions process to help determine a student's propensity for self-direction" (p. 231).
Further research- and theory-based modeling efforts

In addition to the various separate research and theorizing efforts about adult education in general, and specifically self-directed and experiential learning, scholars continue to strive for models that will adequately explicate adult learning. Examples of efforts to synthesize divergent constructs and findings from research into usable conceptual models for explicating learning, include those of Hebron (1983) and Wilson (1984).

Wilson (1984) identified human development (Erikson), field theory (Lewin, Gagne, Ausubel), and cognitive development (Piaget) as three compatible and complementary theoretical bases useful to adult learning theory development. Defining learning as constructing meaning through a change in learner's cognitive structure and using Boyd's 1969, molar and molecular dimensions, he epitomizes constructs and concepts from the above theory bases to organize and explicate the process of learning. According to Wilson (1984), the molar dimension includes the problem-solving phases that provide the "context within or around which learning is organized" (p. 71). During this problem-solving (molar) phase the more finite cognitive processes which constitute the molecular dimension are brought to bear to varying degrees. This molecular dimension Wilson contends, is a cyclic process involving differentiation,
structuring, integration, abstraction, and generalization in a manner unique to the individual. Wilson's model focuses more on memory and cognition consistent with his definition of learning, but in addition includes three time dimensions to capture the role of experience, motives and future anticipations in this dynamic process.

Hebron (1983) attempts a synthesis of selected learning models and constructs and identified three "logically self-evident prerequisites" of a learning situation to include:

(a) There must be a learner moving through developmental stages;

(b) There must be a learning experience usually comprising a sum of expectancies, interventions, and strategies; and

(c) there must be a - probably cyclic - interaction between the learner and the experience (p. 458).

Based on these prerequisites, Hebron (1983) presents a multi-stage eclectic meta-model with five operational levels. Levels 1 and 2 comprise the molar dimension and levels 3-5, the molecular dimension of learning described above. The molar dimension level 1 is the "affective self-realization activity" explainable in terms of adult development theory which provide the bases for the motives and needs of "practical/social activity" in the level 2--which involves "selecting a topic, finding a planner,
joining a group" and so on and consolidates decisions about the context for learning. In the context of self-directed learning, where the learner maintains major control over decisions, the choice of topic and type of planner and so on, can be explicated using self-directed learning research and models.

The molecular dimension (level 3) which is operative throughout the process of learning, including levels 1 and 2 involves "cognitive activity" which seems explicable in terms of Kolb's experiential learning model and may involve one or a combination of abstracting, reflecting, conceptualizing, and experimenting. This level 3 depends on the influences of the levels 4 and 5 (steps in handling information input, and structuring memory data) which presumably is captured by what Kolb (1984) described as "previous experience and habits", and "current circumstances" (p. 97); or by Wilson's (1984) central processing cycle. Using the molar/molecular dimensions of learning allows the consideration of the problem-centeredness of adult learning suggested by andragogy, and evidenced by self-directed learning research findings. Also, Kolb (1985) compares the problem-solving model with the experiential learning model in a manner that allows conceptual exploration of the relationships and implications of each for the other. By superimposing the
two cycles, an additional basis for visualizing the relationship between experiential learning and problem-solving is facilitated. Also the similarities and parallelisms between them become more clear. The requisite cognitive abilities consistent with each stage in the problem-solving cycle can also become more intelligible.

To be successful, self-directed learners have to be sufficiently competent in initiating and managing the process or combination of processes involved in the intentional or deliberate transformation of a chosen or incidental need-relevant experience in a way consistent with their idiosyncrasies and situational limitations. This may involve, as Knowles (1975, p. 18) suggests, "diagnosing learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes". These comprehensive processes are similar in all respects to the problem-solving cycle and must necessarily involve both cognitive and non-cognitive competences and knowledge about their relationship to learning.

Although not directly empirically based, Hebron's (1983) eclectic model provides an insightful and promising conceptual link between self-directed (Tough, 1971) and experiential (Kolb, 1976) learning, both of which are
central to this study. This study essentially subjects this generalized conceptual tie to a more empirical test by further exploring the relationship between the molar and molecular dimension of self-directed learning as they relate to learning styles and readiness for self-directed learning.

In summary, the literature on adult learning provides an extensive array of information about the role of experience, adult characteristics, social roles, particular life situations, and the attendant learning habits, dispositions, and preferences, as central factors in defining, and conceptualizing theory and practice of adult learning. The complexity of adult learning has resulted in multiple theorizing and approaches to facilitating learning that make eclecticism imperative. Also, the uniqueness of the resulting learning traits and idiosyncrasies of the individual has made self-direction not only prominent in contemporary thinking about the theory and practice, but also attractive as a philosophy and goal of adult instruction.

Experience provides the basis for learning, but requires processing or transformation (Knowles 1970, 1975; Freire, 1970; Kidd, 1975; Mezirow, 1985; Jarvis, 1987), based on prior experience which is dependent upon the dialectics of the adult's particular developmental
task/role or the problem situation. Because adults are problem oriented, this transformation is often a part of a problem-solving process. Also, conceptualizing the particular steps involved in the entire process and subprocesses vary according to the theoretical referent employed, and the focus may be on the molar or molecular dimensions or aspects thereof. Thus the resulting descriptions may be directed at the internal mental/cognitive sub-processes (Wilson, 1984) or cognitive orientation/predisposition (Kolb, 1984) or limited to observable external manifestations (Tough, 1971). A common feature however is that they are cyclic and temporal. Furthermore, literature suggests that the resulting learning depends on the way these cycles are engaged and what order the cycle (e.g., Kolb's experiential learning, problem-solving, Wilson's central cognitive processes) is brought to bear in a particular learning transaction.

If experience is widely recognized to be a predisposing and intricate part of adult learning and cognition, and experiential techniques are vital to facilitating adult learning as witnessed by the literature on self-directed adult learning (Brookfield, 1984, 1986; Knowles, 1975), then it makes sense to attempt to explicate self-directed learning via the relatively well-researched and more developed experiential learning model such as
Kolb's (1984). Understanding and facilitating adult learning cannot remain limited to external manifestations of behavioral characteristics alone. To be effective and valid, the underlying individual cognitive fulcrum of this spectrum of socio-political, psychological, physiological processes must constitute the nucleus of professional intervention efforts. The interdependence and interrelatedness of these various dimensions of adult learning necessitate the incorporation of multiple aspects of learning into defining and conceptualizing constructs and variables associated with learning. For example, to capture both the molar and molecular aspects, a construct such as learning style expressed in cognitive terms alone will be incomplete and inconsequential without explicit/implicit recognition and consideration of the influence of attendant affective and psycho-social dimensions.

From the above analysis and expositions, it would seem logico-deductively sensible to postulate that socio-cultural and demographic variables in dynamic relationship provide learning opportunities and experiences which temporally result in idiosyncrasies (in approaches to processing, transforming or relating to experience) which in turn affect competences and readiness for a diversity of options regarding the organizing and transforming of
situational or abstracted experiences. The influence of demographic variables, learning style preferences or learning orientation, and self-directedness of adults have been well researched individually but less so in conjunction. Evidence from the literature would seem to suggest that there is a detectable pattern in the relationship among the three variable groups. Past research studies have reported significant association between demographic variables and preference for learning style than with preference or readiness for self-direction in learning. Furthermore, literature suggests that a preferred or dominant characteristic way of organizing and relating to experience is not permanently fixed, and therefore, with adequate understanding, conscious and deliberate intervention is possible (Freire, 1970, Ramirez and Castaneda, 1974). A ready question is whether learning style preference is indicative of an individual's readiness for self-direction in learning. In other words, can knowledge about learning styles preference contribute to predicting a learner's preparedness for self-directed learning? Is learning style preference more indicative of inner-outer directedness than demographic variables? Adequate understanding of adult experiential self-directed learning, via the relationships between preferred learning style and readiness of an individual to engage in self-
directed learning will further unveil viable ways and means for facilitating the development of effective self-directed learners, and requisite skills and conditions for success.

In accordance with this reasoning, this study is designed to investigate the relationship among three variable groups — demographic, inner-outer directedness and learning orientation. Although recognizably a highly dynamic process that may vacillate between and among all the three variable groups, an understanding of these dynamics is indispensable to conceptualizing and explicating adult experiential self-directed learning, and associated behavioral preferences. Since individuals also vary significantly in their preference for self-directed learning, an understanding of the relationship between learning style preference and readiness for self-directed learning is requisite to identifying meta-cognitive training needs and instructional strategies, and learning styles commensurate with particular demographic situations and levels of preparedness for self-direction in learning.

Summary

The first part of the literature review involved a conceptual exploration of the related theory bases as a framework for understanding the derivative constructs upon which the study is formulated. Each of the three overarching theory bases and the two more specific
Clearly there is a proliferation of definitions, approaches and models about adult learning. Many of these overlap with varying degrees of emphasis on different aspects of the learning process. There is a measure of consensus among practitioners and scholars alike that building on these commonalities and their relationship and inter-relationships will strengthen our understanding of this seemingly elusive phenomenon. However, the equally varied assumptions (implicit or explicit) about the learner and the context of learning which form the core of these theory bases further complicate and limit borrowing across disciplines and traditions of research and theory bases (Boyd and Apps, 1984; Hebron, 1983). By increasing empirical exploration and evaluation of conceptual ties or bridges across traditions of research and theorizing we can increase relevance and validity of context and also
ameliorate the pitfall described by Hebron (1983) as "globe-trotting" and similar concerns expressed by Boyd and Apps (1984). This study is considered to be one of such foundational efforts to subject some of the conceptual ties to more empirical tests and fortify links across diverse areas of related research.

Many principles and models have been variously proposed for facilitating self-directedness specifically, or adult education in general (Knowles, 1975; Bould, 1981; Smith, 1982; Ricard, 1985; Brookfield, 1986; Welds, 1986a, 1986b; Vermunt and Rijswijk, 1988). A dearth of research studies relating self-directedness to learning styles or learning, coupled with the divergence of many of the conceptually derived principles and means for fostering self-directedness in adult learning suggests the need for more empirical and research-based knowledge.

Consistent with the reasoning that experience is an intricate part of adult learning and cognition, and experiential techniques are vital to facilitating adult learning as witnessed by the literature on self-directed adult learning (Knowles, 1975; Brookfield, 1984, 1986), the study attempts to explicate self-directed learning via the relatively well-established experiential learning model. Postulating that socio-cultural and demographic variables in dynamic relationship provide learning opportunities and
experiences which, over time, result in individual idiosyncrasies and predispositions to learning styles and situations, this study explores the relationship among three variable groups - demographic, inner-outer directedness and learning orientation.
CHAPTER 3

METHODOLOGY

Overview

The literature examined in the preceding chapter provides information about the unique role of experience and life situations in adult learning. It suggests that demographic characteristics, learning orientation and inner-outer directedness have implications for adult experiential learning. These implications can only become clearer with adequate understanding of the relationships among these different characteristics and life situations. This study raises and addresses some questions considered pertinent to this understanding.

Research Questions and Hypotheses of the Study

The research questions addressed in the study include:

1. Is there a correlation of inner-outer directedness of subjects (as measured by the SDLRS total scores) with learning orientation (as measured by each of the experiential learning dimensions--taking-in information (abstract-concrete) and transforming information (active-reflective)?)
2. Which of the two learning dimensions (Abstract-Concrete and Active-Reflective) is more predictive of readiness for self-directed learning (SDLR)?

3. Is a significant proportion of the variance associated with subjects readiness for self-direction in learning (SDLR scores) explained more by one, or a combination of learning orientations (learning style inventory scores—abstract-concrete, active-reflective)?

4. To what extent do demographic variables (age, gender, nationality, academic major, program of study and prior work experience) explain readiness for self-directed learning?

The following research hypotheses were employed to address the above questions:

\[ H_1: \] The transformation dimension (AE-RO scores) will be significantly (P < .05) more predictive of readiness for self-directed learning (SDLRS scores) than the prehension or taking-in of information dimension (AC-CE scores).

Secondly, it was hypothesized that if the transformation (of experience) dimension is more indicative of readiness for self-direction in learning than the prehension (taking-in of information) dimension, then

\[ H_2: \] Individuals with preference for each of the Accommodator and Converger style types will be
significantly \((P < .05)\) more ready for self-directed learning than those with preference for the Assimilator and Diverger style types.

\(H_3\): The demographic variables (age, gender, nationality, academic majors, and prior work experience) will have a significant \((P < .05)\) indirect association (the learning style inventory scores) with the SDLRS scores.

This implies that the demographic variables influence readiness for self-direction indirectly through their direct effects on the learning style variables.

\(H_4\): After nationality and program are accounted for, none of the demographic variables will contribute significantly \((P < .05)\) to the variance associated with subjects readiness for self-directed learning (SDLR scores).

This chapter describes the procedures and methods employed in this study to address the research questions and hypotheses presented in chapter one and further reviewed by the selection of literature examined in the preceding chapter. The research design, instrumentation, sampling techniques, data collection and analysis procedures are described. The population and sample characteristics are also reported.
Research Design

The research design utilized in this study is the ex post facto research design using causal comparative and correlational analysis methods. Correlational studies, according to Borg and Gall (1983) "...includes all those research projects in which an attempt is made to discover or clarify relationships through the use of correlation coefficients" (p. 572). A further examination of the hypothesized relationships among the variables of interest to the study was carried out using a path analysis procedure which Borg and Gall (1983) suggested would enhance interpretability.

The study investigated the relationship between a person's readiness for self-directed learning and his/her learning style. Predominant learning style among adult learners with varied demographic background and readiness for self-directed learning were also compared.

Variables of the Study

The dependent variable of the study is self-directed learning readiness (SDLR), as measured by the total score of subjects on the SDLR instrument (Guglielmino, 1977). The independent variables include learning style type and learning orientation as measured by Kolb's (1984) learning style inventory, and demographic variables. Demographic variables included age, gender, nationality,
program of study, degrees held, academic major, and prior work experience.

**Instrumentation**

The data collection was done through a survey consisting of the two instruments -- the Self-Directed Learning Readiness Scale (SDLRS) and the Learning Style Inventory (LSI) described below, and a subsection consisting of questions that elicit information about the demographic variables of interest to the study (age, gender, nationality, academic majors, program of study and prior work experience). Refer to Appendix C.

**The Self-Directed Learning Readiness Scale (SDLRS)**

The SDLRS developed by Guglielmino (1977) for measuring readiness for self-directed learning has been used in a variety of studies and with a variety of populations. Its use is increasing as more validation studies show consistent support for its reliability (Brockett, 1985), content and construct validity (Hassan, 1981; Long and Agyekum, 1983, 1984). It is a 58-item, 5-point Likert-type scale designed to collect data on the respondents' perceived SDL readiness based on 8 factors, namely:

1. Attitude toward and joy of learning.
2. Self-confidence in abilities and skills for learning.


4. Attraction to new and unusual situations.

5. Openness to learning situations.

6. Internal control.

7. Self understanding.


Statements designed to provide information on the above eight factors are each responded to by asking subjects to circle one of five options on a likert-type scale. The five options are: 1) "Almost never true of me; I hardly ever feel that way"; 2) "Not often true of me; I feel this way less than half of the time"; 3) Sometimes true of me; I feel this way about half of the time"; 4) "Usually true of me; I feel this way more than half of the time"; or 5) "Almost always true of me; there are very few times I do not feel this way."

Guglielmino and Guglielmino (1982), based on results from a variety of studies, suggested classification of an individual's level of readiness for self-direction in learning (total score on the SDLRS) into: --low (58-176), --below average (177-201), average (202-226), above average (227-251), and --high (252-290). These categorizations are fraught with the usual problems of pure types and the
dilemma of defining boundaries and cut-off points for each category. Because of the very nature of learning, no individual is totally devoid of self-direction. A logical presumption therefore, is that self-directed learning readiness exists in every adult to varying degrees, and there is no absolute criterion for delimiting each category.

Reliability and Validity of the SDLRS

Guglielmino (1977) developed the SDLRS based on a three-round delphi technique; and through a factor analysis, identified the eight factors listed above related to readiness for self-directed learning. The original instrument consisted of 41 items which has since been revised to the current 58-item scale. She reported the reliability of the SDLRS as 0.87 (n = 307) based on a sample of subjects in Georgia, Virginia and Canada.

Torrance and Mourad (1978) found a significant correlation between SDLRS and style of thinking and creativity by using 3 originality measures. Also, Mourad and Torrance (1979) further investigated the construct validity of SDLRS using principal component analysis and a Teacher Rating Scale (TRS). A significantly positive correlation was found between SDLRS and TRS (r = .25; n = 569) and consistently, 8 similar factors were identified. Sabbaghian (1979) using a sample of 77 adult students at
Iowa State University, also reported a significant relationship between self-concept and seven of the SDLRS factors.

Long and Agyekum (1984) were concerned about the apparent silence of SDLRS literature on the "effects of cultural differences as may be revealed by comparative studies". They conducted and compared two studies using a multi-trait-multi-method matrix to investigate the relationships of SDLRS to dogmatism and faculty rating (based on the factors purported by the SDLRS). Their sample consisted of black and white students in two Georgia colleges. They concluded that their findings lend support to the validity of the SDLRS, and that age is significantly associated with faculty ratings on SDLRS. They also noted that race seems to influence faculty ratings on SDLRS.

Hassan (1981) compared significant correlations found between the eight component factors and total SDLRS scores. The range of correlations were from $r = .45$ to $r = .89$. She thus proclaimed support for the construct validity of the SDLRS instrument. She also found that the SDLRS instrument can discriminate between high and low involvement in self-directed learning activities, and in general, has a high predictive validity. The predictive validity of SDLRS instrument is also supported by results of Hall-Johnsen's (1985) investigation of which of the
eight factors is most predictive of involvement in self-directed learning projects.

Also, Brockett (1985) investigated the relationship of life satisfaction to readiness of 64 subjects, aged 60 years and older, using the 58-item version of the SDLRS. His findings support the reliability of the SDLRS ($r = .87$). However, Brockett cautions that his study of these older adults with low formal schooling suggests that the SDLRS may be biased toward school learning, and therefore, raises questions about the validity of the instrument for certain groups of subjects. This is not a problem with this study because the population is composed of individuals with high levels of formal education.

Also more recent studies utilizing more sophisticated statistical tools are raising additional questions about problems associated with construct validity, especially in the light of the conceptual infinitude and ambiguities surrounding the whole idea of self-directed learning. For example, West and Bentley (1989) used a confirmatory analysis based on LISREL (LInear Structural RELations) model to data from 439 administrators and teachers in Tennessee to assess the measurement model underlying the SDLRS instrument. It was reported that all the parameter estimates were highly significant with the exception of item 7. He suggested that the validity of the original
model underlying the SDLRS can be enhanced by further exploring the result of his analysis, which identified a more parsimonious six-factor model with equally effective and comparable results as the eight-factor model. West and Bently further suggested that an orthogonal model was inadequate for the SDLRS measurement model, and that, in fact, a one-factor model based on the total SDLRS scores "will provide a more interpretable measure than the highly intercorrelated factor scores" (1989, p. 17).

Finally, most recently, Field's (1989) criticism of the SDLRS further suggests that the instrument measures a homogeneous rather than a multi-factorial construct. Field contends that weaknesses in "...the conceptual foundation which underpin the scale" must be "...overcome before the issue of measurement of construct (or constructs) can be adequately addressed" (p. 138).

However, this problem of conceptual complexity alluded to earlier, goes beyond instrumentation. It circumscribes the entire discussion about self-directedness and adult learning. Like the semantic and definitional problems plaguing the general domain of adult learning and theories, it is doubtful that a consensus will be reached about the delimitations of self-directed learning and readiness for it; rather an open mind, and continued deliberation can
ensure progress toward increasing a grasp and estimation of these elusive sets of constructs.

The Learning Style Inventory (LSI)

Kolb's (1985) LSI is a twelve-item self-description questionnaire that requires respondents to rank-order four words/ phrases according to how well they approximate their behavior in a typical learning situation. Each word or phrase corresponds to one of the four learning modes -- concrete experience (e.g., feeling); reflective observation (e.g., watching); abstract conceptualization (e.g., thinking); and active experimentation (e.g., doing). Essentially, the LSI measures respondent's relative emphasis on each of the four modes of the learning process. The subject's preference for Kolb's (1985) learning style types (diverger, converger, assimilator, and accommodator) based on the learning style matrix presented in chapter one is identified using the learning orientation median scores as described in the data analysis section. The four types are derived as a function of the individual's relative preference for a combination of concrete-abstract and active-reflective continua of learning orientation. This indicates the extent to which the respondent prefers abstractness over concreteness, and action to reflection respectively. For example, a diverger combines preferences for a concrete (e.g., feeling) mode of experiencing or
taking-in information with a reflective (e.g., watching) mode of transforming information in the context of learning.

Validity and Reliability of the LSI

Kolb's learning styles inventory is a popular instrument for identifying predominant learning styles of individuals, and has been applied to many different populations and situations. Questions of reliability and validity have also been addressed by many scholars (Kolb, 1976; Fry and Kolb, 1979; Dorsey and Pierson, 1984).

Kolb's Learning Style Inventory Technical Manual (1976) provides detailed information about the reliability and validity of the LSI instrument. Split-half reliability coefficients of AC-CE and AE-RO, obtained from 5 groups of subjects (n = 687) was 0.80; while test-retest reliability coefficients ranged from 0.30 to .61 and 0.43 to 0.71 for the AC-CE and AE-RO scores respectively (Kolb, 1976). Although the 12-item instrument used in this study is an updated version of the original 9-item LSI (Kolb, 1976), and, as such, is only beginning to garner data about reliability and validity, it is considered an improvement over the former version (Bonham, 1988b).
Population and sample of the study

The study sought to compare subjects on the two constructs (learning style and self-directed learning readiness) across gender, nationality, work experience, academic major, program of study and age. Accordingly, efforts were made to select a sample with equal numbers or proportions of subjects for each demographic group represented. However, due to the scope of the study, and cost and time constraints the population was stratified only by nationality and gender which constitute the main variables of interest to this study. Gender was classified by two categories--male and female. Nationality was classified into three categories, namely, American, foreign from more developed countries (MDCs), and foreign from less developed countries (LDCs). The foreign categories were based on the United Nations (1986) classification. According to this classification, MDCs include all of Europe and North America; Australia, New Zealand, Japan and the USSR. The rest of the world is classified as LDCs.

Graduate students enrolled at Iowa state University during spring, 1989 semester constituted the population of the study. The population consisted of 2366 Americans (64.5%) and 1303 (35.5%) foreign students. A breakdown by gender revealed that 1317 (55.7%) of the Americans were
males and 1049 (44.3%) were females; while 941 (72.2%) of the foreign students were males and 362 (27.8%) were females. The category of foreign students from more developed nations (MDC) represented only ten percent (38 females and 95 males, for a total of 133) of the population. See Table 1. Only one subject each from Australia and New Zealand; five from great Britain; ten

Table 1. Frequency distribution (number and percentages) of population and sample by selected demographics

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Sample Number</th>
<th>%</th>
<th>Population Number</th>
<th>%</th>
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</tr>
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<td>Male</td>
<td>150</td>
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<td>2258</td>
<td>61.5</td>
</tr>
<tr>
<td>Female</td>
<td>150</td>
<td>50.0</td>
<td>1411</td>
<td>38.5</td>
</tr>
<tr>
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<td>300</td>
<td>100.0</td>
<td>3669</td>
<td>100.0</td>
</tr>
<tr>
<td>Nationality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>150</td>
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<td>64.5</td>
</tr>
<tr>
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<tr>
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<tr>
<td>Total</td>
<td>300</td>
<td>100.0</td>
<td>3669</td>
<td>100.0</td>
</tr>
</tbody>
</table>

from Japan; 48 from North America; and 68 from Europe (none from USSR) were represented in this category. The rest were from developing nations. It was originally intended to make comparisons on the basis of three nationality classifications identified above, but due to relatively low number of subjects in the MDCs category; and because many
countries in this category were not represented, this
category was dropped from the study. Thus, the
nationality variable originally constructed as three
categories was reduced to two—American, and foreign
students from less developed nations. A total sample of
300 students was selected from this stratified population.

Data Collection Procedures

Based on the comprehensive list of 3,669 graduate
students registered at Iowa State University in spring 1989
for graduate programs, the population was stratified by
nationality and gender which are two demographic variables
of interest to the study.

Random numbers were assigned by the computer to each
of the four resulting groups of male/female
Americans/foreign students. The first non-repeating 75
subjects were selected for the study, for a total of 300
subjects. The final sample of 300 subjects is made up of
75 males and 75 females from each of these two nationality
categories.

Permission to use the LSI instrument was granted (via
telephone) by the author in December 1988. Also,
permission was granted to use the SDLRS instrument by the
author in March 1989.

Approval for the use of the survey research
instrument, with the subjects was granted by the Iowa State
University human subjects review committee in December 1988 (see Appendix F).

The questionnaire was titled 'Adult learning questionnaire' (refer to Appendix C). The titles of the original instruments were not adopted to avoid bias of subjects' responses. Rather, the demographic information sub-section was labeled Part 1; the learning style inventory, Part 2; and the self-directed learning readiness scale instrument, Part 3. Following a pilot-test with ten subjects, the questionnaires were mailed to the selected subjects, in April 1989, with the request to return the completed questionnaire within two weeks (see Appendix D).

Forty-eight percent or 145 questionnaires were returned from the initial mailing. Two weeks later, a reminder (refer to Appendix E) was mailed and an additional 33 questionnaires were returned for a total of 178. This brought the final return rate, after the second and final mailing to 59.3%.

Data analyses were conducted using the Statistical Package for Social Sciences (SPSS\textsuperscript{K}), available on the Iowa State University's mainframe computer programs and services. Statistical procedures included descriptive statistics, Pearson product-moment correlations, one- and
two-way analyses of variance (ANOVA), multiple regression and path analyses.

Sample Characteristics

The final sample on which the analyses are based included 178 subjects who returned the questionnaires. Overall, all 178 questionnaires were usable for the descriptive statistical analysis, in part, or to varying degrees for the other more involved statistical analytic computations. Ninety-four percent (168) of the LSI and ninety-nine percent (176) of SDLRS data sets respectively, were completely usable for many of the analyses carried out; 133 data sets were fully completed without any missing or tied responses; while 35 (19.7%) had three or less missing and/or tied responses for which the means for each case were substituted. The mean of the appropriate learning mode (AC, CE, AE, RO); and the mean SDLRS score was substituted for missing or tied LSI or SDLRS responses respectively. Table 2 presents a breakdown of sample by demographic characteristics. Four individuals did not indicate their nationality. Ages for all subjects, ranged from 21 to 62 years with a mean of 30.5, (median = 29.0 and mode = 25; n = 177). Two individuals were in a specialist and special education administration certificate program respectively. Also, two subjects were non-degree-seeking, and were only taking courses. About
equal numbers of holders of both bachelors and master's degrees were in each of social and physical sciences. Also, about equal proportions - 47.4% (82) of students were majoring in people-oriented (social) sciences while 51.4% (89) were in the object-oriented (physical) sciences. One respondent indicated an undeclared major. Thirty (16.9) students reported an undergraduate minor in the social sciences and twenty (11.2%) in the physical sciences.

One hundred and forty subjects reported prior work experience in professional and/or technical job types; nineteen (10.7%) each reported either no prior work experience or indicated their work experience as other types. Other types of work experience indicated included: blue collar (general labor, factory, construction); private tutor; service (bartender, bus driver, waiter, fast food, farmhand); housewife and mother; secretarial/clerical; military officer; administrator; sales management; and government official. Part-time job experience ranged from 0.3-9.0 years, and was reported by 31 students; full-time employment ranged from 0.3-27 years, and was reported by 93 students. An additional nine students reported experience in full-time employment but did not indicate the number of years. The total number of subjects who had prior work experience was 159. Seventy (43.3%) of these were males and 89 (50.0%) females.
Variables of the study included both continuous and categorical measures. Therefore, coding and/or recoding was necessary for some of the variables prior to statistical calculations and hypotheses testing.

Age was measured in years; gender as two categories - male and female; nationality was categorized into 2 levels namely, American (American students); Foreign (International students from Developing nations).

Academic major and minor were posed as open-ended questions but responses were generally consistent with Iowa State University academic major classifications and coding systems. These were then coded into two broad and general categories—social sciences and physical sciences. The social sciences included academic majors such as education, English, literature, arts, journalism etc., while physical sciences included those of the natural sciences e.g., biology, physics, chemistry, etc. Respondents' degree programs were classified according to two categories—master's and doctorate.

Prior work experience was measured in years of prior work experience in three categories—professional, technical and other; and two employment types—full and part-time. The data analysis was based on the total amount of professional and/or technical work experience. Subjects
Table 2. Frequency distribution of sample by selected demographic variables

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Americans No (%)</th>
<th>Foreign No (%)</th>
<th>All Subjects No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>31 17.8</td>
<td>44 25.3</td>
<td>75 43.1</td>
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<tr>
<td>Female</td>
<td>50 28.7</td>
<td>49 28.2</td>
<td>99 56.9</td>
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<tr>
<td>Total</td>
<td>81 46.6</td>
<td>93 53.4</td>
<td>174 100.0</td>
</tr>
<tr>
<td><strong>Enrollment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>31 18.0</td>
<td>8 4.7</td>
<td>39 22.7</td>
</tr>
<tr>
<td>Full-time</td>
<td>49 28.5</td>
<td>84 48.8</td>
<td>133 77.3</td>
</tr>
<tr>
<td>Total</td>
<td>80 46.5</td>
<td>92 53.5</td>
<td>172 100.0</td>
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<td><strong>Degree Prog.</strong></td>
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<td></td>
<td></td>
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<td>Masters</td>
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<td>56 32.4</td>
<td>100 57.8</td>
</tr>
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<td>Doctorate</td>
<td>33 19.1</td>
<td>27 21.4</td>
<td>70 40.5</td>
</tr>
<tr>
<td>Other</td>
<td>3 1.7</td>
<td>-</td>
<td>3 1.7</td>
</tr>
<tr>
<td>Total</td>
<td>80 46.2</td>
<td>93 53.8</td>
<td>173 100.0</td>
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<tr>
<td><strong>Academic Major</strong></td>
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<td>43 25.7</td>
<td>37 22.2</td>
<td>80 47.9</td>
</tr>
<tr>
<td>Physical Sci.</td>
<td>34 20.4</td>
<td>53 31.7</td>
<td>87 52.1</td>
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<tr>
<td>Total</td>
<td>77 46.1</td>
<td>90 53.9</td>
<td>167 100.0</td>
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<td><strong>Work Experience</strong></td>
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<td></td>
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<tr>
<td>Professional</td>
<td>32 18.4</td>
<td>39 22.4</td>
<td>71 40.8</td>
</tr>
<tr>
<td>Technical</td>
<td>8 4.6</td>
<td>11 6.3</td>
<td>19 10.9</td>
</tr>
<tr>
<td>Other</td>
<td>7 4.0</td>
<td>11 6.3</td>
<td>18 10.3</td>
</tr>
<tr>
<td>Pro &amp; Tech</td>
<td>10 5.7</td>
<td>15 8.6</td>
<td>25 14.4</td>
</tr>
<tr>
<td>Pro &amp; Other</td>
<td>12 6.9</td>
<td>2 1.1</td>
<td>14 8.0</td>
</tr>
<tr>
<td>Tech &amp; Other</td>
<td>2 1.1</td>
<td>-</td>
<td>2 1.1</td>
</tr>
<tr>
<td>All Three</td>
<td>4 2.3</td>
<td>3 1.7</td>
<td>7 4.0</td>
</tr>
<tr>
<td>None</td>
<td>6 3.4</td>
<td>12 6.9</td>
<td>18 10.3</td>
</tr>
<tr>
<td>Total</td>
<td>81 46.6</td>
<td>93 53.4</td>
<td>174 100.0</td>
</tr>
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<td><strong>Age Groups</strong></td>
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<td>21-25</td>
<td>21 12.1</td>
<td>22 12.6</td>
<td>43 24.7</td>
</tr>
<tr>
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<td>37 21.3</td>
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<td>36-40</td>
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<td>8 4.6</td>
<td>22 12.6</td>
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<tr>
<td>Over 40</td>
<td>9 5.2</td>
<td>3 1.7</td>
<td>12 6.9</td>
</tr>
<tr>
<td>Total</td>
<td>81 46.6</td>
<td>93 53.4</td>
<td>174 100.0</td>
</tr>
</tbody>
</table>
were also compared on the number of years of professional and technical experiences by employment types. A total of eight categories of prior work experience types resulted from the three basic categories—professional, technical, and other, and their combinations thus: professional and technical, professional and other, technical and other, professional and technical and other. These combination categories indicate prior work experience in more than one employment type. For example, a subject in the professional and technical category must have reported work experience in both professional and technical type jobs.

Numeric values were assigned to each of the different categories of the nominal demographic data to facilitate subsequent statistical computations and analyses.

Numeric responses (scores) ranging from 1 to 5, to questions contained in the SDLRS instrument were entered directly into the computer. However, some recoding of 17 reversed items was done before calculating each subject's total scores, and scores on each of the eight factors of the SDLR scale. Guglielmino and Guglielmino's (1982), five categories or levels of readiness for self-direction in learning, based on total SDLRS scores were used to compare subjects. The total self-directed learning readiness scores were treated as continuous variables for the correlational and path analyses.
The learning style inventory (LSI) raw scores provided the data on the dominant learning abilities of the subjects by adding column totals of the twelve items as instructed by Kolb (1985). From these were computed the learning orientation scores—concrete-abstract (AC-CE) and active-reflective (AE-RO). Subjects' scores on the concrete experience modes are subtracted from the abstract conceptualization scores; and reflective observation scores from active experimentation scores, for the abstract-concrete (AC-CE) and active-reflective (AE-RO) orientation scores respectively. These scores indicate the extent to which the respondent prefers abstractness over concreteness, and action over reflection respectively.

The subject's preference for Kolb's (1985) learning style types (diverger, converger, assimilator, and accommodator) based on the learning style matrix presented in chapter one is identified using the learning orientation norm scores. Individuals who score lower than the sample median on both AC-CE and AE-RO dimensions scores are classified as divergers, while those with higher than median are convergers. Individuals with lower than median AC-CE but higher AE-RO scores, are accommodators, and those with higher than median AE-RO and lower than median AC-CE are classified as assimilators. These four types represent an individual's relative preference for a combination of
abstract-concrete and active-reflective dimensions/continua of learning, based on the norms scores of the group.

Although these four categories were used for comparison of groups, the LSI raw scores provided information on the dominant learning abilities or modes within and across groups. Also, the computed learning orientation scores—abstract-concrete (AC-CE) and active-reflective (AE-RO) continua were treated as continuous variables for the correlational analysis.

The Statistical Package for Social Sciences (SPSS*) of the ISU computer services was employed to process the data collected. Descriptive statistics, breakdown and crosstabulation analysis procedures were carried out on all the variables in different combinations to address objectives 1 and 2—identification and description of learning styles and inner-outer directedness of respondents across demographic variables.

Objective 3 involved the comparison of subjects' learning style preferences and preparedness for self-directed learning across demographic groups. This was addressed by the results of testing hypotheses related to objective 4 and post hoc analyses involving two auxiliary null hypotheses. One- and two-way analyses of variance were conducted to evaluate whether there is a significant difference in the mean LSI and SDLRS scores by the
demographic variables (age, gender, nationality, academic major, program of study, degrees held, type of prior work experience, prior employment types, and years of prior work experience). Oneway analysis of variance (ANOVA) involves "partitioning, isolation and identification of variation in a dependent variable due to different independent variables" (Pedhazur, 1982, p. 3). Interpretation of results of the ANOVA is based on the F-statistic which represents the ratio of the between \((\text{MS}_b)\) to the within \((\text{MS}_w)\) group variance estimates—\(\text{MS}_b/\text{MS}_w\) (Hinkle et al., 1988).

Pearson product-moment correlation and multiple regression analyses were used to address objective 4, hypotheses 1-4. A conceptual model was advanced in Chapter 1 (Figure 3) to summarize and further explore hypotheses 3 and 4. Prior to the analyses and testing of these hypotheses, a correlation matrix was generated to study the pattern of relationship between pairs of all variables of the study and to guide decisions about which variables will be included in the regression models.

The correlation matrix generated was used to make comparisons of the relative strengths of association of LSI scores and SDLR scores with demographic variables, and to make decisions about which variables will be included in the different regression models. Numeric values were
assigned to treat the demographic categorical variables as continuous variables for the purpose of the regression and path analysis.

To answer the question of which learning style dimension is more predictive of self-directed learning readiness (hypothesis 1), a test of difference between two population correlation coefficients based on dependent samples was carried out. The formula and procedures presented by Hinkle et al. (1988) were employed for this test.

Hypothesis 2 was addressed in part, by the algebraic implications stemming from the relationships found from the results of testing hypothesis 1, and based on oneway analysis of variance. In order to investigate to what extent demographic variables (age, gender, nationality, academic major, program of study and prior work experience) explain readiness for self-directed learning (hypotheses 3 and 4), two regression models - full model and demographic model; were generated, tested and compared:

1. Full model: \( Y = B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_0 \)

2. Demo model: \( Y = B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_0 \)
where \( Y \) = the predicted SDLRS score; \( B \) = the regression coefficient (i.e., the slope of the regression line); and \( B_0 \) = regression constant, the \( Y \)-intercept (see key below).

**Key**

\( Y \) = SDLRS (Self-directed learning readiness score)  
\( X_1 \) = AC-CE (abstract orientation score)  
\( X_2 \) = AE-RO (active orientation score)  
\( X_3 \) = NATIONAL (subject's nationality)  
\( X_4 \) = AGE (Subject's age)  
\( X_5 \) = WORKEXP (Years of work experience)  
\( X_6 \) = PROGRAM (Current degree program)  
\( X_7 \) = MAJOR (Academic major)  
\( X_8 \) = GENDER (Subjects gender)

To test the path model proposed in the study, three additional models were necessary: one was to explore the relationship between demographic variables and each of the two learning style dimensions -

3) \[ X_1 = B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_0 \]

4) \[ X_2 = B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_0; \]

To identify the direct influences of the demographic variables on SDLRS, reference was again made to the demographic (demo) model above -

5) \[ Y = B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_0 \]

Beyond the predictive use of multiple regression analysis in this study, the evaluation of the model presented adds latitude to the use of multiple regression
as an explanatory tool, and enhances interpretation of results. Also, it allows further exploration of possible or implied causal relationships, based on extant theory and body of knowledge about the variables of interest.

This conceptual model hypothesized direct and indirect associations of the demographic variables (age, gender, nationality, academic majors, program, and prior work experience) with LSI (AC-CE and AE-RO) and SDLRS scores. A path analysis procedure was used to test the validity of this recursive (i.e., unidirectional causal flow) path model. Unidirectionality of causal flow implies that a variable cannot be both a cause and an effect of another variable at the same point in time.

According to Braxton and others (1988), a causal model premised on theory and informed thinking, needs to be subjected to empirical test. Path analysis, a statistical procedure based on regression analysis is the valid method of choice and most prevalent in the literature for such a test. The path analysis method subjects the postulated causal model to empirical test and helps to establish the magnitude and paths of the postulated relationships.

In the model presented, the demographic variables are treated as exogenous variables, and learning style and inner-outer directedness as endogenous variables. Pedhazur (1982) describes an exogenous variable as one whose
"variability is assumed to be determined by causes outside the causal model" and an endogenous variable as one "whose variation is explained by exogenous or endogenous variables in the system" (p. 581). The model presented in this study does not include a consideration of the relationships among the exogenous (demographic) variables themselves.

The results of these statistical analyses and procedures on the data are provided and discussed in the next chapter.
CHAPTER 4

RESULTS

Overview

This study was designed to identify, describe and compare the self-directed learning readiness and learning styles of adult learners across selected demographic variables (nationality, age, gender, academic major, degree program and prior work experience); and to investigate the relationships of the demographic variables to learning styles and readiness for self-directed learning. Data relevant to these objectives were collected from a sample of 178 graduate students registered in spring 1989, in full- and part-time degree programs at Iowa State University through a three-part survey instrument described in the preceding chapter.

This chapter presents a description of the data and results of statistical tests of the hypotheses of the study. The results are reported under three main sections:

1) Description of subjects and data distributions;
2) Empirical testing of hypotheses and path model of the study.
3) Post Hoc Analyses.
Description of subjects and data distributions

Table 3 summarizes subjects' readiness scores by the different demographic variables. Respondents' total SDLRS scores ranged from 170.9 to 286 with a mean score of 230.8 and a standard deviation of 22.3 (median = 232.5 and mode = 208). Based on Guglielmino and Guglielmino's (1982) five levels of readiness for self-directed learning, Appendix A - 1, indicates that over half of the subjects had an above average level of readiness for self-directed learning. About one-third of the subjects had an average level of readiness for self-directed learning, and only about one-tenth of the respondents scored below the average. A bar graph in Appendix A - 2, aids the visualization of the distribution of SDLRS scores for the entire sample of subjects.

The LSI scores for the subjects in this study are presented in Table 4, Appendix B - 1, and Appendix B - 2. From the summary of measures of preference for learning modes (Appendix B - 1) we can observe that abstract conceptualization (AC) is the dominant mode of taking-in information for both males and females in this sample, and active experimentation (AE) mode of transformation is dominant for both. The pattern is similar for the other demographic variables.
<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Ns</th>
<th>mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77</td>
<td>229.10</td>
<td>20.61</td>
</tr>
<tr>
<td>Female</td>
<td>99</td>
<td>232.07</td>
<td>23.48</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>American</td>
<td>79</td>
<td>238.64</td>
<td>18.14</td>
</tr>
<tr>
<td>Foreign</td>
<td>93</td>
<td>223.82</td>
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<tr>
<td><strong>Enrollment</strong></td>
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<td></td>
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<tr>
<td>Part-time</td>
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<td>235.42</td>
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<tr>
<td>Full-time</td>
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<td>229.30</td>
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<td>Physical Sci.</td>
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<td>236.21</td>
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<td>230.16</td>
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<td>Technical</td>
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<td>Other</td>
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<td>24.09</td>
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<td><strong>All Subjects</strong></td>
<td>176</td>
<td>230.77</td>
<td>22.26</td>
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Table 4. Descriptive statistics of respondents learning style inventory (LSI) measures

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD^</th>
<th>Mode</th>
<th>Median</th>
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<tr>
<td>AC</td>
<td>34.7</td>
<td>8.3</td>
<td>45</td>
<td>35</td>
<td>36</td>
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<tr>
<td>CE</td>
<td>24.8</td>
<td>8.0</td>
<td>23</td>
<td>23</td>
<td>36</td>
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<tr>
<td>AE</td>
<td>32.3</td>
<td>6.6</td>
<td>31</td>
<td>32</td>
<td>30</td>
</tr>
<tr>
<td>RO</td>
<td>28.4</td>
<td>6.7</td>
<td>26</td>
<td>28</td>
<td>34</td>
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<tr>
<td>AC-CE</td>
<td>9.9</td>
<td>14.6</td>
<td>18</td>
<td>12</td>
<td>70</td>
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<tr>
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<td>3.8</td>
<td>11.2</td>
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<td>4</td>
<td>57</td>
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</tbody>
</table>

^SD=Standard Deviation.

The AC and CE scores each ranged from a minimum of 12 to a maximum 48; AE ranged from 16 to 46; and RO ranged from 13 to 47. Scores on the abstract-concrete or taking-in information dimension ranged from -36 to 34; and Active-reflective (AE-RO) or transformation dimension scores ranged from -25 to 32.0.

It is noteworthy that the mode for this group of subjects was zero for the AE-RO dimension. This indicates that equal preference for both active experimentation and reflective observation modes of transforming experience is most frequent. The mode of 18 obtained for the taking-in of information dimension suggests that subjects in this sample most frequently prefer the abstract
conceptualization mode of prehension over the concrete experience mode.

Empirical Testing of Hypotheses and Path Model

This section is devoted to statistical testing of the main hypotheses and path model advanced in this study. The section is concerned with ascertaining whether there are statistically significant linear and/or predictive relationships between the demographic variables (age, gender, nationality, academic major, program of study, enrollment, work experience), learning style measures, and readiness of subjects for self-directed learning.

First, the direct effects of learning style/orientation on readiness for self-directed learning, and the relationships between learning style types and readiness for self-directed learning, are examined. Secondly, statistical testing of the paths hypothesized in the model of the study are evaluated, including the direct and the indirect effects of demographic variables, and the direct effects of learning style preference on self-directed learning readiness.

As a precursor to the evaluation of the multiple relationships and prediction models proposed, a general correlational exploration of bi-variate relationships between all variable pairs was carried out. A Pearson
correlation procedure was employed for this exploratory examination of whether there is a relationship between the demographic variables, learning style, and readiness for self-directed learning. Appendix B - 3 provides a matrix of the different correlation coefficients and probability levels of linear relationships between all pairs of these variables. Table 5 contains a summary of the correlation coefficients between SDLRS scores and LSI and the main demographic variables.

No previous study has investigated the relationships among the learning style preferences of adult learners and their readiness for self-directed learning. The first question of whether there is a linear relationship between subject's inner-outer directedness (SDLRS) scores and learning orientation was addressed first by evaluating the correlation coefficients of their relationships. Secondly, regression analyses provide statistics for additional evaluation and testing of not only the unique, but also the partial correlation of each of the learning style dimensions (AC-CE, AE-RO) and the inner-outer directedness (SDLRS) of subjects.

A cursory evaluation of this relationship based on the correlation matrix (Table 5 and Appendix B - 3) indicates that both AC-CE \( (r = .15, p < .05) \) and AE-RO \( (r = .25, \)
Table 5. Correlation coefficients between demographic variables, LSI scores
SDLRS, AC-CE, and AE-RO scores

<table>
<thead>
<tr>
<th>Variables</th>
<th>SDLRS (r)</th>
<th>AC-CE (r)</th>
<th>AE-RO (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC-CE</td>
<td>.15*</td>
<td>1.00</td>
<td>-.04</td>
</tr>
<tr>
<td>AE-RO</td>
<td>.25**</td>
<td>-.04</td>
<td>1.00</td>
</tr>
<tr>
<td>Gender</td>
<td>.07</td>
<td>.33</td>
<td>.09</td>
</tr>
<tr>
<td>Nationality</td>
<td>-.33**</td>
<td>.09</td>
<td>-.17</td>
</tr>
<tr>
<td>Major</td>
<td>.06</td>
<td>.13*</td>
<td>.15*</td>
</tr>
<tr>
<td>Program</td>
<td>.20**</td>
<td>.09</td>
<td>.04</td>
</tr>
<tr>
<td>Age</td>
<td>.08</td>
<td>-.02</td>
<td>.03</td>
</tr>
<tr>
<td>Work Experience (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total years</td>
<td>.13</td>
<td>-.19*</td>
<td>.15*</td>
</tr>
<tr>
<td>Part-time</td>
<td>.17</td>
<td>-.02</td>
<td>.31**</td>
</tr>
<tr>
<td>Full-time</td>
<td>.08</td>
<td>-.21*</td>
<td>.16</td>
</tr>
<tr>
<td>Technical</td>
<td>.07</td>
<td>.00</td>
<td>.10</td>
</tr>
<tr>
<td>Professional</td>
<td>.09</td>
<td>-.11</td>
<td>.17</td>
</tr>
</tbody>
</table>

* Significant at > .05.
** Significant at > .01.

p < .01) are each positively correlated with SDLRS scores beyond .05 and .01 significance levels respectively. Although the magnitude of relationship as indicated by the correlation coefficients is not very large, the positive relationships of each of the learning style orientation/dimensions with inner-outer directedness scores are supportive of an affirmative response to research question 1; that is, inner-outer directedness in learning
is correlated with preference for an experiential learning orientation. This means that as an individual’s score on either of the experiential learning dimensions increases, readiness for self-directed learning increases. Also, the two experiential learning dimensions, AC-CE and AE-RO, are not significantly correlated with each other ($r = -.04$, $p > .05$). This result is consonant with expectation from theory (Kolb, 1976).

**Relationship between learning styles and readiness for self-directed learning**

**Hypothesis 1** $H_1$: The transformation dimension (AE-RO scores) will be significantly ($P < .05$) more predictive of readiness for self-directed learning (SDLRS scores) than the prehension or taking-in of information dimension (AC-CE scores).

To identify which of the learning style dimensions is more highly correlated with readiness for self-directed learning (research question 2) a comparison of the indices of correlation is needed. This test was done using the procedures and formula for testing the null hypothesis that there is no difference between two population correlation coefficients based on dependent samples provided by Hinkle and others (1988). Based on this formula, the calculated t-value of 0.97 was obtained and compared with the table t-value of 1.96. Since the calculated $t = .97$ (df = 167) was
less than the critical value from the table at the .05 level of significance, the null hypothesis that there is no significant difference between the correlation coefficients of the relationships of the two learning style dimensions (AC-CE and AE-RO) with SDLRS scores was retained. This means that the transformation dimension of the experiential learning model is not significantly more predictive of readiness for self-directed learning than the prehension dimension in the population from which the sample was drawn.

**Relationship of learning style types and self directed learning readiness**

**Hypothesis 2**  
$H_2$: Individuals with preference for each of the Accommodator and Converger style types will be significantly ($P < .05$) more ready for self-directed learning than those with preference for the Assimilator and Diverger style types.

This hypothesis is based on the conjecture that regardless of preferred mode of taking-in information, individuals who have a preference for an active mode of transforming experience (as indicated by high AE-RO scores) will be significantly more inner-directed (more ready for self-directed learning) than those with a preference for a reflective mode of transforming experience. Rationale for this conjecture is provided in Chapter 1.
This hypothesis was addressed in part, by the results of the tests for hypothesis 1 and a one-way analysis of variance procedure. The hypothesis is partly supported by presence of a one-tail positive correlation of SDLRS scores with both AC-CE and AE-RO experiential learning dimensions (Table 5). A single classification (oneway) analysis of variance was run to compare subjects' group means on total SDLRS by the four learning style types—accommodator, diverger, assimilator and converger. The null hypothesis that there is no significant difference in the average SDLRS scores of subjects with preference for each of the four learning style types was rejected \((F = 5.8, p < .01)\). See Table 6. Because the observed significance level is more than .01, it is very unlikely that an F-ratio of this magnitude will be obtained when the null hypothesis is true. Therefore, since the sample means are an estimate of the population means, the hypothesis that individuals in the population from which the sample for this study was drawn, who have a preference for accommodator, assimilator, converger or diverger learning style type have a similar level of readiness for self-direction in learning is rejected. The mean SDLRS scores for the four learning style types are provided in Table 7.
Table 6. One-way analysis of variance of SDLRS scores by learning style types

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F ratio</th>
<th>F prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>3</td>
<td>7841.62</td>
<td>2613.8749</td>
<td>5.82*</td>
<td>.0008</td>
</tr>
<tr>
<td>Within groups</td>
<td>157</td>
<td>70465.35</td>
<td>448.8239</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>78306.98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at > .01.

The SDLRS scores for the divergers ranged from 176.01 to 256.0, accommodators' SDLRS scores ranged from 194 to 286, assimilators ranged from 170 to 271, and convergers, from 197.4 to 267. The total SDLRS scores for the whole sample ranged from 170.95 to 286.

Table 7. Summary of one-way analysis of variance of SDLRS scores by learning style types

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Ns</th>
<th>mean</th>
<th>Standard deviation</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Style Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convergers</td>
<td>40</td>
<td>235.0</td>
<td>19.1</td>
<td>5.82*</td>
</tr>
<tr>
<td>Assimilators</td>
<td>40</td>
<td>230.6</td>
<td>22.6</td>
<td></td>
</tr>
<tr>
<td>Divergers</td>
<td>41</td>
<td>218.5</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>Accommodators</td>
<td>40</td>
<td>235.9</td>
<td>20.4</td>
<td></td>
</tr>
<tr>
<td>All Subjects</td>
<td>161</td>
<td>229.9</td>
<td>22.1</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at > .01.

Scheffe's post hoc multiple range test indicated that the mean SDLRS scores of the convergers and accommodators
are significantly different from those of the divergers. The post hoc test failed to detect a significant difference between the average SDLRS scores of the assimilators and any of the three other groups. The results of the multiple comparison procedure which are displayed in Table 8 indicate that the accommodators and convergers are significantly more ready for self-direction in learning than the individuals who indicated preference for the diverger learning style type.

Therefore, the accommodators and convergers who share a preference for active experimentation are more ready for self-directed learning than the divergers. Hypothesis 2 therefore is supported in part. Figure 5 also displays the location of subjects' average preference for learning styles by selected demographic groups.

Table 8. Scheffe's test for SDLRS by learning style types

<table>
<thead>
<tr>
<th>Groups</th>
<th>Accommodators</th>
<th>Converger</th>
<th>Assimilator</th>
<th>Diverger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>235.9</td>
<td>235.0</td>
<td>230.6</td>
<td>218.5</td>
</tr>
</tbody>
</table>

Empirical testing of model

Hypotheses 3 and 4 Hypothesis 3 predicted that demographic variables are indirectly indicative of a person's degree of readiness for self-directed learning
(SDLRS scores) through their direct association with learning style (AE-RO, AC-CE scores). Hypothesis 4 further stated that after nationality and program of study are accounted for, none of the other demographic variables will have a predictive capability for readiness for self-directed learning.

<table>
<thead>
<tr>
<th>Percentiles</th>
<th>ACCOMMODATOR</th>
<th>DIVERGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>- American</td>
<td>- Foreign</td>
</tr>
<tr>
<td>10-</td>
<td>- Female</td>
<td>- Male</td>
</tr>
<tr>
<td>20-</td>
<td>- Physical science</td>
<td>- Social science</td>
</tr>
<tr>
<td>30-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60-</td>
<td>CONVERGER</td>
<td>ASSIMILATOR</td>
</tr>
<tr>
<td>70-</td>
<td>- Doctorate</td>
<td></td>
</tr>
<tr>
<td>80-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5. Matrix of learning style dimensions locating subjects by selected demographic variables.
Table 9 shows that the demographic model accounted for 14% (R = .38, p < .05) of the variance in SDLRS scores, while the full model accounted for 21% (R = .46, p < .05). A test of the R square increment of .07 was found to be significant. Two of the other demographic variables (years of work experience and academic major) are significant predictors of learning style scores. Therefore, hypothesis 3 which stated that demographic variables will have a significant (p < .05) indirect effect (through learning style) with readiness for self-directed learning is generally supported. However, this support is partial since only the relationships of two of the six demographic variables were significant. The results from the full model are corroborative of hypothesis 4 that after nationality and program of study are accounted for, none of the demographic variables will contribute significantly (p < .05) to the variance associated with readiness for self-directed learning. The results of testing hypotheses 3 and 4 indicate that a combination of demographic and learning orientation variables better predicts readiness for self-directed learning than either alone. Also, the demographic variables were found to have both direct and indirect associations with self-directed learning readiness. These relationships are further explored by comparing the results of the empirical model with the conceptual model advanced.
In consonance with the hypotheses of the study, the theoretical model posited direct and indirect associations of the demographic variables (age, gender, nationality, academic majors, program, and prior work experience) with LSI (AC-CE and AE-RO) and SDLRS scores. A path analysis procedure was used to test the validity of this recursive model.

To identify the path coefficients for the model, five multiple regression models were evaluated as follows:

1. Full model—Forward selection multiple regression of the criterion variable (SDLRS) on all the other exogenous demographic variables (age, gender, nationality, academic major, program of study, prior work experience), and endogenous variables—learning style measures (AC-CE, AE-RO).

2. Demographic model—Forward selection multiple regression of inner-outer-directedness (SDLRS) scores on all demographic variables (age, gender, nationality, academic major, program of study, prior work experience).

3. Active-reflective model—Forward selection multiple regression of transformation of experience dimension (AE-RO) scores on all demographic variables (age, gender, nationality, academic major, program of study, prior work experience).
4. Abstract-concrete model—Forward selection multiple regression of taking-in of information dimension (AC-CE) scores on all demographic variables (age, gender, nationality, academic major, program of study, prior work experience).

5. Test model—consisting of two steps:
   a) Forward selection multiple regression of the learning style measures (AC-CE, AE-RO) on the two demographic variables (nationality and program) hypothesized and depicted in the path model as having a direct linear effect on inner-outer readiness (SDLRS) scores.
   b) This was followed by a forward stepwise multiple regression command to enter any of the other four demographic variables (academic major, prior work experience, age and gender) which were depicted in the model to have no direct linear relationship (only indirectly, through learning predisposition) with the criterion variable (SDLRS scores). This was done to see if any of them will contribute additionally, to subjects' variance on SDLRS scores beyond that explained by the direct effects of the first set of variables as indicated in the model.
Table 9 contains a summary of the results of the five models.

The regression equations for the five models are:

1. Full model
   \[ \text{SDLRS} = 0.24 \text{AC-CE} + 0.39 \text{AE-RO} + 7.40 \text{PROGRAM} - 14.16 \text{NATIONALITY} + 234.38 \]

2. Demo model
   \[ \text{SDLRS} = -14.36 \text{NATIONALITY} + 8.98 \text{PROGRAM} + 240.16 \]

3. AE-RO model
   \[ \text{AE-RO} = 5.07 \text{MAJOR} - 6.67 \]

4. AC-CE model
   \[ \text{AC-CE} = -0.72 \text{WORK EXPERIENCE} - 9.70 \]

5. Test model
   \[ \text{SDLRS} = 7.61 \text{PROGRAM} - 14.16 \text{NATIONALITY} + 0.39 \text{AE-RO} + 0.24 \text{-AC-CE} + 237.59 \]

The magnitude of relationships and direction of effects posited in the model between exogenous and endogenous variables are shown in Figure 6. Both the path coefficients and the correlation coefficients (parenthesized) from the correlation matrix (Table 5) are included for comparison. This illustrative empirical model (data-based version or revision of the proposed theory-based model) facilitates the visualization of variable relations, and comparison with the theoretical model being investigated and tested for tenability (Figure 3). Also, the magnitude of effects generated by a simple bivariate
Table 9. Summary of multiple linear regression models for the analysis of SDLRS scores variance

<table>
<thead>
<tr>
<th>Model/Variables in equation</th>
<th>Multiple R</th>
<th>R square</th>
<th>B</th>
<th>Beta</th>
<th>F Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full</td>
<td>.46</td>
<td>.21</td>
<td></td>
<td></td>
<td>10.85**</td>
</tr>
<tr>
<td>AC-CE</td>
<td>.24</td>
<td>.15*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE-RO</td>
<td>.39</td>
<td>.19**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>7.40</td>
<td>.16*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nationality</td>
<td>-14.16</td>
<td>-.32**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>234.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demo</td>
<td>.38</td>
<td>.14</td>
<td></td>
<td></td>
<td>21.05**</td>
</tr>
<tr>
<td>Nationality</td>
<td>-14.36</td>
<td>-.32**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td>8.98</td>
<td>.20**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>240.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE-RO</td>
<td>.28</td>
<td>.07</td>
<td></td>
<td></td>
<td>2.40*</td>
</tr>
<tr>
<td>Major</td>
<td>5.07</td>
<td>.23**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-6.67</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC-CE</td>
<td>.26</td>
<td>.07</td>
<td></td>
<td></td>
<td>2.01</td>
</tr>
<tr>
<td>Work experience</td>
<td>-.72</td>
<td>-.23*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-9.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test</td>
<td>.46</td>
<td>.21</td>
<td></td>
<td></td>
<td>11.35**</td>
</tr>
<tr>
<td>Program</td>
<td>7.61</td>
<td>.17*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nationality</td>
<td>-14.16</td>
<td>-.31**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AE-RO</td>
<td>.39</td>
<td>.20**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC-CE</td>
<td>.24</td>
<td>.16*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>237.59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant > .05.
** Significant > .01.
correlation technique can be compared with the path coefficients generated by a more sophisticated and powerful statistical technique—path analysis. As stated by Braxton et al. (1988), "multiple regression permits the identification of the magnitude of the effect of each independent variable above and beyond the effects of other pertinent variables on a focal dependent variable" (p. 266). The path coefficients which are quantitative indices of the magnitude and direction of relationships are represented by the partial regression coefficients or beta weights produced by the regression analyses.

No attempt is made to explain the variability within or between the exogenous demographic variables. The usual way to represent the relationships among the exogenous variables is the use of curves with arrow heads on both ends. However, rather than complicate the model with curved arrows, a correlation matrix of the relationships of all the variables in the system, including the demographic variables are provided in Appendix B - 3. Details of the correlations of the other demographic variables with each other and with the LSI and SDLRS measures are presented in Appendix B - 4. Although age and work experience are highly positively correlated with each other (r = .74 p = < .01), both were included in the regression analyses as
Figure 6. Empirical model of relationships among demographic variables and learning style on self-directed learning readiness.
planned, since neither is significantly correlated with the dependent variable of the study (SDLRS).

The results of the path-analysis were applied to test the tenability of the theoretical model of overall possible causal relationship among inner-outer directedness, learning orientation, and selected pertinent demographic factors. In general the observed or obtained path model (Figure 6) supported the postulates of the theoretical model advanced (Figure 3 and stated in hypotheses 3 and 4) with regard to the direct effects and paths of nationality, academic program, and learning orientations (AC-CE, AE-RO).

The predicted indirect effects of the demographic variables on SDLRS, via learning predispositions or orientations were only partially supported. While age, gender and employment type showed neither direct nor indirect influence on inner-outer directedness (SDLRS), indirect influence was observed for academic major and years of prior work experience. Academic major influences readiness for self-direction in learning via the transformation (AE-RO) experiential learning dimension. Years of prior work experience influences an individual's level of readiness for self-directed learning through the prehension (AC-CE) learning dimension.
A more detailed discussion of the results of the path analysis and further comparisons with the theoretical model advanced is presented in Chapter 5.

Post Hoc Analyses

Although the results of preceding analyses provide insights into the trends of relationships among the variables of the study, additional post hoc analyses were carried out to facilitate comparisons among the demographic groups of interest and further address objective 3. Accordingly, this section compares subjects on self-directed learning readiness and learning style measures by demographic variables. In order to effectively carry out these comparisons, two sets of auxiliary null hypotheses were formulated and tested to investigate whether there is a significant difference in the mean LSI and SDLRS scores by the demographic variables (age, gender, nationality, academic major, program of study, type of prior work experience, prior employment types, and years of prior work experience). The null hypotheses were:

Ho(1): There are no statistically significant differences in the average SDLRS scores among

a) the two nationality groups (American and foreign);

b) the two gender groups (male and female);

c) the two program groups (master's and doctorate);
d) the five age groups;
e) eight types of prior work experience;
f) the two academic major groups; and
g) enrollment groups (part-time and full-time).

Ho(2): there are no statistically significant differences in the average LSI (AC-CE and AE-RO) scores among

a) the two nationality groups (American and foreign);
b) the two gender groups (male and female);
c) the two program groups (master's and doctorate);
d) the five age groups;
e) eight types of prior work experience;
f) the two academic major groups; and
g) enrollment groups (part-time and full-time).

Subjects' inner-outer directedness and learning styles were compared, based on results of statistical analyses of the within- and between-group differences in mean scores, using a single classification analysis of variance (ANOVA). As shown in Table 10, the subjects were found to differ significantly by nationality ($F = 20.85, p < .01$), academic degree program ($F = 7.76, p < .01$), and prior work experience ($F = 2.70, p < .05$) groups. Therefore, the hypotheses that there are no significant differences in the average SDLRS scores among nationality, degree program and
type of prior work experience groups were rejected.

Readiness for self-directed learning (mean SDLRS scores)

Table 10. One-way analyses of variance of SDLRS scores by demographic variables

<table>
<thead>
<tr>
<th>Sources of Variation</th>
<th>F-value</th>
<th>Significance of F-value</th>
<th>Degrees of freedom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationality</td>
<td>20.85*</td>
<td>.0000</td>
<td>1, 170</td>
</tr>
<tr>
<td>Degree program</td>
<td>7.76*</td>
<td>.006</td>
<td>1, 171</td>
</tr>
<tr>
<td>Work Experience</td>
<td>2.70*</td>
<td>.0113</td>
<td>7, 168</td>
</tr>
<tr>
<td>Gender</td>
<td>.7730</td>
<td>.3805</td>
<td>1, 174</td>
</tr>
<tr>
<td>Academic Major</td>
<td>.6566</td>
<td>.4189</td>
<td>1, 167</td>
</tr>
<tr>
<td>Enrollment Status</td>
<td>2.2536</td>
<td>.1351</td>
<td>1, 172</td>
</tr>
<tr>
<td>Age groups</td>
<td>.4768</td>
<td>.7527</td>
<td>4, 171</td>
</tr>
</tbody>
</table>

* Significance at ≥ .01

Table 11. One-way analysis of variance of AE-RO scores by academic major

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>Sum of squares</th>
<th>Mean squares</th>
<th>F ratio</th>
<th>F prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>477.15</td>
<td>477.15</td>
<td>3.85*</td>
<td>.0514</td>
</tr>
<tr>
<td>Within groups</td>
<td>160</td>
<td>19814.57</td>
<td>123.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>161</td>
<td>20291.72</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at ≥ .05.
did not differ significantly by gender, academic major, employment types, age groups, and enrollment status.

Also, analysis of variance of mean learning style inventory scores (AC-CE, AE-RO) by demographic characteristics revealed no significant differences except for academic major groups which were significantly different on AE-RO scores. Refer to Table 11. Therefore, the null hypothesis that preference for AE-RO style does not differ significantly between the two academic major groups was rejected ($F = 3.85, p \leq .05$).

Due to the high correlation found between nationality and SDLRS scores, possible interaction effects on the relationships observed for the other demographic variables was further explored. To check the influence of nationality on the average SDLRS based on the other demographic groups, a two-way classification analysis of variance was done. No two way interaction effects were identified between nationality and gender ($F = 1.16, p > .05$); age groups ($F = 1.60, p > .05$); degree program ($F = 3.58, p > .05$); academic major ($F = 2.85, p > .05$); type of work experience ($F = 1.26, p > .05$); and enrollment status ($F = 0.33, p > .05$). Interaction effects beyond the two-way were not examined.

Finally, the absence of any predictive relationship of age to LSI is inconsistent with previous studies (Kolb,
1976; Dorsey and Pierson, 1984) which reported a curvilinear relationship. To further examine this and other possible non-linear relations, a scattergram of age with each of the learning style orientations and self-directed learning readiness scores was generated. Also, curvilinear regression analyses were run to identify polynomial relationships (1/age, age square, age cube and square root of age). Refer to Appendix B - 4. None of these relationships was significant.
CHAPTER 5

SUMMARY, DISCUSSION, CONCLUSIONS, IMPLICATIONS
AND RECOMMENDATIONS

Overview

This chapter summarizes and concludes the study. Practical and theoretical implications based on the results and conclusions are identified, and suggestions for further research are put forward. The chapter is organized into six sections. The first part provides a synoptic review of the purposes and procedures of the study while the second part summarizes the major findings of the study. The third section further discusses the results of hypotheses and model testing. In the fourth section, conclusions are drawn from the findings. A fifth section identifies some practical and theoretical implications; and the final section offers some recommendations for further research.

The study is basically a model-testing and theory-building research project. The purpose of this study was to identify, describe and compare the self-directed learning readiness and learning styles of adult students across selected demographic variables (nationality, age, gender, academic major, degree program and prior work experience). In addition, the study examined the
relationships among learning styles, readiness for self-directed learning and these demographic variables.

The study was guided by four major research questions and conjectures (see Chapter 1) about the relatedness of these variable groups.

Four main research hypotheses presented in chapter 1 and restated in Chapter 3, were used to address the research questions. In general, it was conjectured that demographic and biographic variables shape an individual's learning orientation which in turn influences his/her level of preparedness to be self-directing in learning. Based on adult learning, and more specifically self-directed, and experiential learning literature and theory bases, a conceptual model was put forward for testing and to summarize the hypotheses of the study. Additionally, two sets of auxiliary null hypotheses were tested to facilitate and authenticate comparison of demographic groups on average inner-outer directedness and preference for experiential learning styles.

Data pertinent to the focus of the research were collected from a random sample of 178 graduate students registered in spring 1989, in full- and part-time degree programs at Iowa State University. The sample was stratified by gender and nationality. A three-part self-reporting questionnaire described in the preceding
Chapter was employed to collect the data. The instrument included Kolb's (1984) LSI and Guglielmino and Guglielmino's (1982) SDLRS instrument.

The description of subjects are based on results of descriptive statistics, breakdown and crosstabulation procedures of the mainframe computer version of the Statistical Package for the Social Sciences (SPSS*).

One-way and two-way analyses of variance (ANOVA) statistical procedures were computed for average inner-outer directedness (total SDLRS scores) and learning style preference (AC-CE and AE-RO scores) by each demographic variable. The F-statistics and probability of significance were used to test the auxiliary hypotheses.

To identify whether there is linear and/or predictive relationships between each of the learning styles (AC-CE and AE-RO) and readiness for self-directed learning, results from Pearson product-moment correlation analyses were statistically evaluated.

Finally, the conceptual model which synthesizes hypotheses 3 and 4 was evaluated based on the results of a path analysis involving five multiple regression models.

Summary of Findings

Levels of readiness for self-directed learning differ significantly by learning style types, nationality, academic program (p < .01), and type of prior work
experience ($p < .05$). American students in this sample were significantly more ready for self-directed learning than the foreign students.

There is a significant positive, linear and predictive relationship between each of the two dimensions of experiential learning and degree of readiness for self-directed learning.

Nationality and degree program exert direct positive effects on readiness for self-directed learning ($p < .01$). They show no significant influence on preference for learning style.

Academic major indirectly influences readiness for self-directed learning through its direct influence on preference for the transformation (AE-RO) experiential learning dimension or style ($p < .01$).

Years of prior work experience exerts an indirect influence on readiness for self-directed learning through its direct influence on preference for taking-in information -- AC-CE ($p < .05$).

A combination of demographic variables (nationality and degree program) and experiential learning style (AC-CE, AE-RO) scores are more predictive of readiness for self-directed learning ($p < .01$) than either alone.
Age, gender and employment type showed neither direct nor indirect influence on inner-outer directedness in learning (SDLR).

Discussion of Results

The first objective of the study was to identify the learning style preferences of the subjects based on Kolb's experiential learning model and categories.

On the average, preference for abstract conceptualization and active experimentation were the most dominant styles for the entire sample. The relative preference for abstractness over concreteness may be partly due to the fact that this group is composed of subjects pursuing higher degrees in a relatively highly abstract academic environment typified by a university. The mean AC-CE of 9.9 is further from the theoretical center than the mean AE-RO of 3.8. However, the AE-RO scores are comparable to those obtained by Dorsey and Pierson (1984) in their study of 513 students in occupational educational programs in Texas. They reported a mean AC-CE score of 5.1; and an AC-CE mean of 3.2. These scores can also be compared with Kolb's (1976) norm scores AC-CE = 4.2 and AE-RO = 3.2 based on averages from six different studies; and AC-CE = 0.7, AE-RO = 4 reported for 349 Kentucky county extension agents (Pigg and others, 1980).
As noted in the preceding chapter, the mode for this group on the AE-RO dimension is zero. This indicates that a preference for transforming experience that is intermediate between action and reflection was the most frequent for this group of subjects. This has implications for classification into learning style types based on norm scores. Preference for taking-in information (AC-CE) becomes the default criterion in such classification and may be misleading. Practical application of general models about preferences for learning styles, readiness for self-directed learning, and decisions about appropriate learning strategies require additional subjective information about the particular situation. Information about preference for instructional materials, techniques and devices for the particular individual or group must supplement recommendations from theory. This view is supported by literature (Kolb's, 1984; Pigg, Busch and Lacy, 1980).

The second objective of the study was to identify the respondents readiness for self-direction in learning using Guglielmino's (1977) scale. The mean of 230.8 obtained for this sample is greater than the normative average of 214 reported by Guglielmino and Guglielmino (1982). Also, the majority of subjects scored above this normative average level, and only 10.8% scored below this average level. Hassan (1981) investigated the learning projects
and readiness of a random sample of 77 adults in Ames, Iowa. She recorded a mean total SDLRS of 227.9 (standard deviation = 23.9). Similarly, Hall-Johsen (1985) reported a mean total score of 238.43 with a standard deviation of 24.1 for a random sample of 65 Iowa State University Cooperative Extension Service professional staff. In an earlier study of 77 undergraduate subjects also in Ames, Sabbaghian (1979) identified the average readiness score to be 229.1 with a standard deviation of 24.1. Differences in educational level, as suggested by Hall-Johsen, and supported by literature may account for some of the differences observed across different samples. Since the subjects in the study are highly educated, the relatively high SDLRS scores is consistent with expectation.

The third objective of the study was to compare the learning styles and inner-outer directedness across demographic characteristics.

Significant differences in readiness for self-direction in learning is related to select demographic and personal variables such as learning style, nationality, level of education, and prior work experience. The level of readiness for self-directed learning of subjects with preference for the converger and the accommodator learning style types are significantly higher than for those with preference for the diverger style type. Level of readiness
for self-directed learning was higher for individuals with professional work experience than for those with technical or other type of work experience. The highest level of readiness was recorded for persons with both professional and technical work experience and the lowest was for those without any work experience. These findings suggest that technical work experience may be more inclined towards divergent and assimilative styles, while professional work experience may be more accommodative and convergent. Also, a combination of professional and technical experience seems to provide opportunity for a more balanced preference for experiential learning styles. Increasing experience with a combination of convergent and accommodative learning styles probably enhances style integration and increases preparedness for self-directed learning.

The degree of readiness for self-directed learning is similar for males and females. This is consistent with results of previous studies which reported no significant gender differences in readiness for self-direction in learning (Hassan, 1981; Hall-Johnsen, 1985).

Results indicate that preference for learning style is similar across demographic characteristics except academic major.
The fourth, and probably most important objective of this study was to investigate the relationship between respondents' learning style preferences and readiness for self-directed learning. Four research questions and four research hypotheses stated earlier address this objective. Discussions of the Results from testing these hypotheses follow.

**Hypothesis 1 and 2**

The first two questions asked if each of the learning style has a predictive relationship with inner-outer directedness in learning. It was hypothesized that an individual's preference for transformation style (AE-RO scores) is significantly more indicative of his/her preparedness for self-directed learning than the prehension style. Results of the bi-variate correlation analysis support that each learning style is linearly related to readiness for self-directed learning (Refer to Table 5). A statistically significant proportion of variance in SDLRS scores is explained by the variance in each, and both of the learning style scores. Although, in this sample, the transformation dimension appears to be a stronger predictor of subjects' SDLRS scores than the prehension dimension, statistical test indicated that they are not significantly different in their predictive capability in the population.
The presence of a one-tail positive correlation of SDLRS scores with both AC-CE and AE-RO experiential learning dimensions (Table 5), with readiness for self-directed learning provides support for hypothesis 2.

Consistent with expectations from theory (Kolb, 1984), the two experiential learning dimensions, AC-CE and AE-RO, were not significantly correlated with each other ($r = -.04$, $p > .05$). In addition to supporting the expectation from experiential learning theory, (e.g., AC-CE and AE-RO are independent of each other) data from this study which indicate that they are individually positively related to SDLRS scores further suggests that as individuals increase their preference for each, or a combination of active and abstract experiential learning modes, they increase their readiness for self-direction in learning. However, the finding that increasing preference for abstract mode of taking-in information is associated with increasing readiness for self-direction in learning is contrary to the suggestion by Theil (1984) and echoed by Brookfield (1986), that abstract conceptualization abilities are inconsequential or unnecessary for self-directed learning. Also, Pratt (1984) speculated, based on conceptual analyses of the relationship between field articulation (analogous to experiential learning style) and self-directed learning readiness research that individuals with a balanced style...
may be the most ready for collaborative learning. The findings from this study indicate that a combination of active and abstract abilities are needed for self-directed learning. It may also be that a balanced preference for both learning modes (integrated learning style) is required for effective self-directed learning. This may further suggest that individuals with a relatively balanced or integrated learning style will be more prepared for, or predisposed to effective self-direction and learner-initiated collaboration in learning. In addition to the algebraic implications and corollaries stemming from the results of testing hypothesis 1, the results of a one-way analysis of variance and post hoc multiple range tests indicate that the accommodators and convergers who share a preference for active experimentation are more prepared for self-directed learning than the divergers (with preference for reflective observation). Thus, partial support is also provided for hypothesis 2. This result further supports the opposing characteristics of accommodators and convergers to those of assimilators and divergers respectively reported by Kolb (1976).

Hypotheses 3 and 4

The final question raised in this study was: To what extent do demographic variables explain readiness for self-directed learning? Hypotheses 3 and 4 are complementary
and represent the main postulates of the conceptual model positing relationships among demographic variables, learning orientations, and readiness for self-directed learning. Hypothesis 3 predicted an indirect linear relationship of demographic variables (through learning styles) with readiness for self-directed learning.

Further, hypothesis 4 predicted a direct relationship of each of nationality, level of education (academic program), and learning styles (AE-RO and AC-CE) measures to self-directed learning readiness (SDLRS scores).

The result of the statistical comparison of the appropriate regression models indicates that a combination of demographic and learning style measures ($R = .46, p < .01$) is more predictive of readiness for self-directed learning than either alone. These relationships were further explored based on a path analysis of the conceptual model which encompasses hypotheses 3 and 4. However, the object of this model testing effort is not to attribute causality, but to explore the degree to which the prespecified network of informed, yet hypothetical relationships are corroborated by actual data. As Popper (1962) contends, "...observation itself tends to be guided by theory" (p. 118). Observations are indeterminate, and do not in an absolute sense result in theory. Although the path coefficients obtained indicate the degree of
relationship, we cannot conclude causality on the basis of correlational data. A statistically significant regression coefficient is only suggestive of possibility and not certainty of causal connection (Braxton et al., 1988).

The results of the path analysis are compared with the theoretical model and the hypothesized relationships among the variables of the study in the discussion that follows.

Firstly, the theoretical model predicted that a person's nationality (American vs. foreign), program of study (masters vs. doctorate) and learning orientation (preference for experiential learning orientation—AC-CE, AE-RO) have a direct effect on his/her readiness for self-direction in learning (SDLRS). That is, a subject's readiness for self-direction in learning is predicted to be influenced by nationality, program of study, and experiential learning orientations. (This relationship is indicated by direct straight arrows in Figure 3.)

Secondly, the model predicted that six demographic variables indirectly influence a person's readiness for self-directed learning (SDLRS) through their direct effects on the subject's learning orientation (AC-CE or AE-RO). Two of these demographic variables (nationality and degree program) were predicted to have direct influences on readiness for self-directed learning.
Results of the obtained path model (Figure 6) indicate that nationality has a direct, negative effect on readiness for self-directed learning (-.32). Since Americans were assigned a numerical code of 1 and foreign students 2, it follows that the American students are indicated to be more ready for self-directed learning than the foreign students studied. This is corroborative of Brookfield's (1985) speculation based on analogous field articulation literature, that nationality may be a factor in the propensity of an individual for self-direction in learning. Program of study also shows a direct influence on readiness for self-directed learning (.20) as preconceived. This suggests that subjects in the doctorate program are more ready for self-directed learning than those in a master's program. This is consistent with previous findings that level of education affects levels of readiness for self-directed learning (Sabbaghian, 1979; Hassan, 1981; Brockett, 1983). In short, the results of the path analysis are consistent with expectations that an individual's program of study (which is an indication of level of formal education) and nationality have direct influence on his or her readiness for self-directed learning. Therefore, hypothesis 4, that after nationality and program are accounted for, none of the demographic variables will contribute to the prediction of SDLRS is
supported. However, Hall-Johnsen's (1985) conclusion that gender and program of study are not significantly related to self-directed learning beyond a bachelor's degree are only partially supported by the expositions of the current analysis. This may be due to the relatively more diverse nature of the subjects in this study. While gender showed neither direct nor indirect influence on SDLRS, direct influence was observed for program of study. Given the generalized operational definition of nationality in this study, these results seem indicative of some underlying cultural differences in the two groups. Attempts at this point, to identify these socio-cultural factors can only be speculative. These factors may be connected with the general level of economic activities and availability of materials and infrastructure for the types of non-accreditation learning activities identified with adult self-directed learning. An additional source of explanation may be a consideration of whether there are differences in subjects' interpretation of the term 'learning' in a manner that systematically affects their responses to the SDLRS questionnaire.

Regarding the second set of postulates about the relationships of the demographic variables with SDLRS, some of the predicted linkages or paths were obtained, others were not.
It was predicted that each of the demographic variables would indirectly influence an individual's readiness for self-directed learning through each of the learning style dimensions (AC-CE, AE-RO). This speculation was premised on the conjecture that demographic variables are more influential in shaping an individual's learning style preference than in shaping his or her readiness for self-directed learning; and that the resulting learning orientation more directly influences the individual's level of readiness for self-direction in learning. However, only academic major and total years of work experience were supported by the obtained model, with path coefficients of .23 and -.23 respectively. Academic major influences readiness for self-directed learning through the transformation (AE-RO) dimension, while years of prior work experience indirectly influences readiness for self-directed learning through the prehension (AC-CE) dimension of experiential learning.

The type of formal Education/training an individual has, seems to influence his/her preference for processing or transformation style while the influence of the amount of concrete/practical work experience is manifested in his/her preference for taking-in or prehension of instructional material or experience. Preference for each of these learning styles in turn, influences the person's
consequent preparedness or propensity to assume responsibility for learning. Persons in the object-oriented sciences tend to prefer a more active style for transforming experience, while those in the people-oriented majors prefer a more reflective style. With increasing amount of work experience, individuals tend to prefer a more concrete than abstract style of taking-in information. These implications are consistent with the results of the one-way analysis of variance which identified significant difference in subjects' preference for transformation style by academic major groups. Although the classification in the study is more general in scope (social vs. physical science), results of a direct relationship of academic major is consonant with previous findings (Holtzclaw 1985; Kolb 1984).

Age, gender and type of prior work experience do not singly have any direct influence, nor indirect influence through a person's learning orientation, on his/her readiness for self-direction in learning. The absence of any predictive capability of age for LSI, nor for SDLRS seems to suggest that age is not a factor in the learning orientation of an adult or readiness for self-directed learning. This is similar to results obtained by Loesch and Foley (1988). They investigated the learning styles and preferences of traditional and non-traditional students.
(n = 63) and found that age and gender are not related to learning preferences. This lack of significant relationships is contrary to the findings by Kolb (1976), and Dorsey and Pierson (1984) that learning style is curvilinearly related to age. However, the very high correlation between age and years of prior work experience is suspect. This very high correlation of age with years of work experience may indicate that the influence of the amount of work experience may have contributed to the relationships and distorted the observation from the highly specialized populations of subjects reported in the literature. An alternative argument could be based on the development/temporal dimension of the experiential learning style theory. That is, the absence of relationship of age with SDLRS may also suggest that beyond a certain level of education and/or level of integration or development of style, age ceases to be a significant factor in the individual's preference for experiential learning styles. In addition, the influence of work and educational/social experiences are contributory.

Conclusions

Demographic variables exert both direct and indirect (through learning style) influences on readiness for self-directed learning. Nationality is the most critical factor in predicting the readiness of an individual to engage in
self-planned learning. The degree of readiness of individuals with similar levels of formal education differ significantly, depending on whether one is from a developed nation or a developing nation. The findings about nationality provides additional indices and insights on the role of socio-cultural and cross-national influences on adult self-directed learning.

The experiential learning model is appropriate and effective for exploring the cognitive dimensions of self-directed learning paradigm. Each and both of the two experiential learning dimensions are predictive of an individual's preparedness to engage in self-directed learning. Both abstract and active learning abilities are required for self-directed learning. The accommodator and converger learning style types are predominant among individuals with high readiness for self-directed learning. However, preference for experiential learning styles does not vary by nationality groups.

Level of education, that is, whether one is pursuing a master's or doctorate program influences one's propensity for self-directed learning.

Results from this study indicate that demographic variables (nationality and degree program) alone are more predictive of the level of readiness for self-directed learning than learning styles. Additional information from
preference for style improves the prediction of inner-outer directedness. However after nationality is accounted for, learning style becomes the next best predictor of readiness for self-directed learning.

Academic major and years of prior work experience are indirectly indicative of readiness for self-directed learning.

Age, gender and type of employment showed neither direct nor indirect influence on inner-outer directedness (SDLRS); therefore they have no predictive capability for either self-directed learning readiness or preference for experiential learning style.

The results from this study can help expand the latitude of behavioral and attitudinal attributes associated with the different learning style types. The findings of the study further suggest that self-reporting diagnostic tools such as the LSI and SDLRS can provide predictive indices to supplement or complement situational specifics for a more effective facilitation of adult learning. Criteria and objectives of intervention can be based on a sounder theoretical foundation, and in collaborative consultation with learners, facilitators of adult learning can better identify appropriate strategies.
Implications for practice

Although the magnitude of variance in self-directedness explained by these variables are not large enough to allow definitive statements about implications for practice, these results introduce additional dimensions for understanding adult self-directed learning. The quest for knowledge about factors that are critical to adult self-directed learning is evident from the volume of literature and zeal of research on this subject in the last two decades. Also, many conceptual and pragmatic models and principles have been propounded (e.g., Knowles, 1975; Smith, 1982; Hebron, 1983; Ricard, 1985; Welds, 1986b). Many such models are usually either too general or too abstract and have consequently been limited in application. Self-directed learning research has been limited to external behavioral aspects and activities. External behavioral indices alone are inadequate for conceptualizing the multidimensional phenomenon of adult learning. As Brookfield (1985) contends, "...self-directed learning is concerned much more with an internal change of consciousness" (p. 15). Empirical evidence such as is provided by the findings of this study could help in operationalizing andragogy's broad postulates such as, self-concept, maturity, and problem-centeredness. As discussed in Chapter 2, the impetus for this study was
provided by a desire to broaden the conceptualization of self-directed learning to include both the molar and molecular dimensions of learning described by Wilson (1984) and further explored by Hebron (1983). Empirical testing of aspects of generalized models such as this provides a more scientific basis for adult learning theory and practice.

A striking exposition from the findings of this study is that self-directedness in learning is influenced by demographic characteristics (nationality and education) and learning style preferences. This implies that intervention is possible and feasible. If we know the ways these influences manifest themselves, strategizing for intervention can be enhanced. Since learning styles seem to be the next best predictors of readiness (after nationality), they may provide a plausible basis for fostering self-directed learning readiness. Also, for practical purposes they may provide a more feasible locus of intervention.

Information on learning styles can be used in a variety of ways including, for example, in aiding decisions about programs, in creating a dialogue with, or counseling individual learners about their strengths, weaknesses and opportunities (Price, 1983). Instructional delivery (methods and materials) can be made more congruent with an
adult learner's degree of readiness for self-direction and learning style preferences. Also audience segmentation can be more effectively based on information about preparedness for self-direction in learning and learning style preferences to benefit particular target groups. On the other hand, intervention efforts can be targeted towards improving readiness for self-direction in learning. A more balanced use of the four learning abilities or modes can be encouraged by providing tested techniques and experiences that help integrate an individual's approach to learning.

Additional information provided about the influence of demographic variables can enhance national policies on adult learning, academic advising, and optimizing learner potentials across national, gender and other demographic characteristics. For example, the group of foreign students studying abroad (in the US) were found to be significantly different from the group of American students studying at home in their preparedness for self-direction in learning. This may have important implications for academic advisement, individualized instruction and independent studies. However, caution must be exercised in hazarding comments about practical application of these findings. We need to further unveil what within the enclave of nationality is critical to readiness for self-directed learning. Given the way nationality was
operationalized in this study, additional research will be required before such questions can be answered. Also, since Americans were the only group in the categories for developed nations, the findings cannot be generalized for all developed nations.

However, while research-based learning style information can help maximize learner-resource transactions for varying degrees of self-directed learning readiness, important new directions and opportunities for facilitating effectiveness of self-directed learners can also be conceptualized. For self-directed learners to be effective at identifying and initiating learning needs and goals, identifying and employing appropriate resources and strategies, as suggested by Knowle's definition, they must learn how to learn. Learning how to learn which Smith (1982) describes as acquiring the necessary skills and knowledge to learn effectively in any situation, requires more than concrete or active abilities as in the physical and mechanical manipulation of instructional activities. Effective learners, according to Kolb 1984) "must be able to: reflect on, and observe their experiences from many perspectives (RO); create concepts that integrate their observations into logically sound theories (AC); and use these theories to make decisions and solve problems (AE). The dialectic tension between these polar modes of
adaptation within each of the two learning dimensions (AC-CE and AE-RO) must be effectively resolved. Optimal vacillation within each dimension and oscillation between these dialectical praxis of action and reflection requires critical consciousness--"conscientization" (Freire, 1970). Consciousness in this dynamic process must include both the obvious spatial variables, and all the temporal and idiographic precursory processes and situational dispositions. Over-emphasis or specialization/preference of any one mode results in suppression or neglect of another. This sort of dominance limits effective transformation of experience (Kolb 1984). For example, dominance of action over reflection results in "activism"; and reflection over action leads to "verbalism" (Freire, 1970). In sum, effective learning requires all four modes of transforming experience. Therefore, a well rounded approach which adequately integrates the four adaptive modes and requires the learner to be equally competent at choosing whichever mode is most suited to the particular task or situation without bias, is ideal. This position holds much promise for assisting self-directed learning. The triad of inter-related subconcepts (learning styles, needs and training) posited by Smith, (1982) seems particularly relevant. Smith further asserted that information about learning styles can be viewed as a
training resource. Application of the implications from this study can therefore be used in a variety of ways, depending on the needs of the learner, and of course, on the desired intentions, objectives and directions of intervention. The goal, for example, might be optimization of learner-resource or learner-subject transaction, or on the longer perspective, to foster a more integrated and balanced style of learning. Accordingly, the use of learning style and inner-outer directedness data/information could be directed towards balancing or matching styles with subject-matters or specific learning situations, or providing learning experiences designed to broaden capacity for a more balanced use of each and all of the four experiential learning modes. In general, these results suggest that the type of training or education an individual has, shapes his/her resolution of the dialectic tension between abstract and concrete modes of grasping experience. Similarly, the amount of work experience influences the resolution of the dialectics between active and reflective modes of transforming experience in the context of learning. Although the finding from this study corroborates activity as an index of self-directed learning, additional revelations about the role of abstract conceptualization abilities suggest that a combination of abstract and active abilities are facilitative of an
adult's preparedness for self-directed learning. Therefore, a training which provides and integrates opportunities for convergent and accommodative learning experiences would enhance the development of a more balanced learning style and increase readiness for self-directed learning.

**Implications for theory**

Without adequate understanding of the underlying cognitive structures of self-directed learning (if any), its conceptualization will remain an exclusively behaviorist paradigm. It is a paradigm which is largely antithetical to the implied focus on self-direction or inner-directedness. Behaviorism seems more congruent with, and amenable to Kolb's (1984) assimilator learning style type. Therefore behaviorism cannot adequately explain adult self-directed learning. Although Guglielmino and Guglielmino label their self-directed learning readiness instrument "Learning Style Assessment", inner-outer directedness in learning does not appear to be a style per se. Rather, it is an external manifestation or result, and an integral aspect, of preference for style. However, at the cognitive level, what is done with experience, whether self- or other-mediated becomes highly personalized, individualized and subjective. This makes self-directed learning somewhat redundant at the cognitive level, or at
best, axiomatic. On the other hand, when limited to affective, molar dimensions alone, the term self-planned, -directed, -organized, learning becomes more indicative of a role the learner assumes as the major actor, in the planning and decision-making about the external aspects of the learning process.

Similarly, the term experiential learning seems tautological since experience of some sort is needed for transformation and consequent knowledge creation. Kolb (1984) criticizes Piaget's (1970) overemphasis on the transformation dimension, and ascribes equal importance to both prehension (taking-in) and transformation of experience. However, a closer look at Freire's (1970, 1973) parsimonious pragmatic model of experiential learning (action-reflection praxis) suggests that the two dimensions of learning described by Kolb (1987) are more integrated than separate. While not mutually exclusive, the transformation dimension seems to serve an integrative, facilitative and critical role. The question of which dimension is more critical in function depends on the foci of analysis and particular situation; and is theoretically and philosophically debatable. In practice, and for adults, it seems that the transformation dimension serves as a predisposing tool or facility for receiving, articulating, and consequent processing and transformation.
of concrete or abstract experience or information into knowledge. Although research, including the present study, corroborates their independence, it needs to be remembered that the learning style inventory does not treat them as independent. Being a forced-choice ordinal scale, the possible ranks of responses are dependent on one another. For example, as Bonham (1988b) observed, the classification of learners into four types based on norm scores has serious problems and significant implications for theory. Citing Wunderlich and Gjerde 1978, Bonham (1988b) further questions the validity of Kolb's classification, and suggests that the use of theoretical rather than normative midpoints will alleviate this weakness. A further implication of using normative midpoints for each group is that classifications cannot be generalized. Individuals classified as one type may be clearly different between groups, and in fact, individuals with similar scores on the LSI will be classified differently depending on median/mean scores for the particular group referenced. Another option may be to use Kolb's norm score, but again this is limited in generalizability especially when applied to individuals from a different sociocultural background. Yet, and probably a better option is to limit the comparison to the scores on each dimension (AC-CE, and AE-RO) only. This allows comparison across groups with similar or dissimilar
demographic characteristics. And in addition, a more theoretically sound and standard comparison of individuals and groups with the theoretical mid-point or axis of integration, can be achieved.

Barring physical differences, individuals are equally accessible to sensing abilities - seeing, hearing, feeling, tasting, smelling, and in fact, thinking and intuiting. Levels of consciousness, sensitivity, and effectiveness of use of any one or a combination of these will depend on social experiences, orientations, and training. Regardless of the mode of taking-in information, what is made of the content depends on the way it is transformed. Put another way, given a particular mode of prehension, knowledge creation or learning depends on the mode of transformation. As has been argued by many scholars (Kolb, 1984; Freire, 1970), experience alone cannot result in learning. But since experience can also be abstracted by reflecting on previously created knowledge and reflection-in-action (Bould et al., 1985; Argyris and Schon, 1974), the demarcation between the two dimensions becomes even more infinite. While the subject-matter and clientele may influence a most appropriate medium for presenting experience, transformation becomes less discernible. The individuals within whom learning is finalized, exercise the major control over this aspect. We can assist individuals
to increasingly sensitize this tool but how it manifests itself on perception or prehension is less predictable. Although no less important to the transformation of experience, the prehension dimension, and indeed, what is perceived, is influenced a great deal by the transformation predisposition.

The results of the study raise questions about justification for direct extension of generalizations about adult learning based on research literature from western nations (or a single nation) to adults from developing nations (or other nations). Models about adult learning from western cultures need validation and appropriate qualification based on additional information from developing nations before they can be taken to represent adults world-wide.

The results of a relatively more empirical exploration of the relationships of the critical factors in the dynamics of adult self-directed learning, such as this study, would help shift the focus of analysis from the present predominantly descriptive interpretation to a more structural one. This would also pave the way for a more structural-analytic approach to conceptualizing and strategizing for effective facilitation of adult self-directed learning. Effective learners are those who effectively combine feeling and action; activity with
reflectivity; thinking and doing; cognition and affect. Accordingly, theory-building and efforts to explicate adult learning must be integrative.

Recommendations For Further Research

The model tested in this study should be replicated separately using a more representative sample of graduate students from developed and developing nations. The revised model of the relationship among demographic characteristics, learning styles and inner-outer direction in learning warrants further testing. It is here suggested that the revised model should be applied to graduate students in other universities and similar populations. This can then be compared with populations with different demographic characteristics. In this way the integrity of the model can be fortified, and its utility enhanced. Further, a valid and more generalized model can be evolved.

In addition, other models involving socio-cultural variables related to nationality can be conceptualized. This will facilitate and upgrade our understanding of the influence of nationality on preparedness for self-direction in learning. Americans were used as an example of developed nations. Although, probably the most diversified of all the developed nations, America cannot adequately be taken as a prototype of all developed nations with so
diverse political and cultural systems. The age range, sample size and educational level of the subjects studied were limited. Therefore, the study should be replicated with larger samples from diverse populations with regard to educational levels, age, and occupational experience. For instance, a plausible speculation from the results from this study is that adults with lower levels of formal schooling, who are relatively highly prepared for self-direction in learning, would prefer an active style of transforming experience; and with increasing amounts of work experience, would tend to prefer a more concrete than abstract style of taking-in information/experience. However, their approach to organizing and executing actual learning activities and preference for instructional materials, methods, and media may be significantly different from those of formal schooling. Additional information about adults from other developed nations are needed for comparison with the present observations between the adults from developing countries and Americans.

The extent of relatedness of the results of this study to actual learning behavior needs to be investigated. For instance, learning style preference and inner-outer directedness can be compared between actual self-directed learning, and institution- or other-directed learning within and across subject matter areas and demographic
groups. Also, the influence of orthodox/traditional western schooling can be compared with non-traditional and other indigenous approaches.

It should also be informative to explore the implications of a balanced preference for experiential learning styles on readiness for self-directed learning. The modal score on the AE-RO dimension of experiential learning was zero for the subjects studied. The implications of such a balanced or simultaneous preference for activity and reflectivity for self-directed learning is yet unclear. Further research can help to unveil this relationship. A closer analysis (through appropriate research design) of this group of learners can help clarify speculations alluded to earlier.

Kolb (1984) discusses three levels of the developmental dimension of the experiential learning model—acquisition, specialization and integration. Longitudinal studies may also help to establish the relationship of the development dimension of experiential learning with readiness for self-directed learning. Also, this might facilitate the identification of a relatively stable normative axis of integration available as an empirical referent and comparable to the theoretical axes and midpoints.
Central to the concept of self-direction in learning is decision-making and locus of control. The notion of molar/molecular dimensions of the learning process described earlier, necessitates further investigation into their relationships to self-directed learning. The molar dimension which involves decisions about what to learn, where to learn and so on, suggests that decision-making preferences may play a role in these external logistics. It would be interesting to explore the relationship of decision-making/management styles to learning style preferences and/or inner-outer directedness.

The SDLRS instrument

The cross-cultural validity of the SDLRS instrument is far from established. In general, there is also a dearth of research on self-directed learning about adults in developing countries. Judging from the statements contained in the SDLRS, and a lack of definition of what constitutes learning in the instrument, it is unclear to what extent differences in perception or definition of learning systematically affects subjects' responses; and to what degree this is manifested in the variances observed in subjects' total SDLRS scores. Also, given that the way SDL is operationalized in the literature in general is different from formal school learning, it may be necessary to alert the respondents to the broader meaning intended by
the term 'learning' in the instrument. Also, examples of learning activities could be provided to clarify this definition and guide respondents as is done in Tough's (1971) self-directed learning interview schedule. This question requires further research.

The LSI instrument

Locating individuals or groups on the matrix of style types needs to be more standardized. Scores close to the midpoints on either dimension become problematic. Additional criteria could be provided, based on prior research or theory to guide classification of such scores. This will standardized the classification of such scores and facilitate comparison across studies.

Efforts to fine-tune these instruments and further validate them across cultures must be continuous. This would improve their utility and effectiveness as diagnostic tools. Therefore, more cross-cultural validity studies should be carried out for both the LSI and SDLRS instruments.

Additional and sustained research efforts are required to further our understanding of the relationships among traditional schooling, readiness for self-directed learning and learning styles. The implications and prospects for
integrating traditional schooling and adult learning would also become clearer.

In summary, despite reports from the literature that all adults carry out self-directed learning projects, evidence from this study indicate that the propensity or preparedness to do so is influenced by demographic and learning dispositions. Although, empirical support provided by the findings of the study is significant, it is by no means conclusive. Interpretations must be made in the light of the assumptions and the limitations of the study, measurement and operational definition of the variables studied. An over-simplification of the variables and processes of adult learning which would seem contradictory to the philosophical tenets of self-directed learning is not the goal of this research project. However, results of the study suggest that socio-demographic and cultural factors play a significant role in a person's preparedness to assume major control of one's learning. Therefore an adequate knowledge and understanding of the critical (cognitive and non-cognitive) variables of the process of self-directed learning can inform practice and facilitate strategizing for andragogical intervention.


Kirby, P. (1979). *Cognitive style, learning style and transfer skill acquisition.* Columbus, OH: The Ohio State University National Center Research in Vocational Education.


ACKNOWLEDGEMENTS

I would like to express sincere gratitude to the various individuals who have contributed to the success of this interesting academic pursuit.

I am particularly grateful to Dr. John Wilson for his guidance and scholarly advice and moral support throughout the project. I express appreciation to my committee members: Dr. Irene Beavers, Dr. Mary Huba, Dr. Dennis Warren, and Dr. William Wolansky whose invaluable expertise helped shape the direction of this study. Also, I would like to thank Dr. William Miller and Dr. Richard Warren for assistance offered during the data analyses.

My special thanks to Dr. George Jackson and Dr. Larry Ebbers for their assistance in financing aspects of the research. The initial funds provided by the Federal Government of Nigeria is also acknowledged. I express my appreciation to the graduate students who provided the data for the study.

Finally, I wish to express my gratitude to my brothers, sisters and parents for their patience, understanding and loving support throughout my schooling.
APPENDIX A - 1: FREQUENCY DISTRIBUTION OF SUBJECTS' SELF-DIRECTED LEARNING READINESS LEVEL BY GENDER, NATIONALITY, ACADEMIC MAJOR AND PROGRAM OF STUDY
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<th>Above average (227-290)</th>
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<td>No (%)</td>
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Low
Below Average
Average
Above Average
High

PERCENT

2
16
53
73
32
APPENDIX B - 1: MEANS AND STANDARD DEVIATIONS OF LEARNING MODE SCORES BY DEMOGRAPHIC VARIABLES
## Learning Modes

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^aNumber of subjects.

^bAll three types of work experience (professional, technical and other).
APPENDIX B - 2: MEANS AND STANDARD DEVIATIONS OF LEARNING ORIENTATION SCORES BY DEMOGRAPHIC VARIABLES
### Learning Styles

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*a*Number of subjects.

*b*All three types of work experience (professional, technical and other).
APPENDIX B - 3: PRODUCT MOMENT CORRELATIONS BETWEEN SDLRS, LSI SCORES, AND SELECTED DEMOGRAPHIC VARIABLES
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Note. (Coefficient / (Cases) / 1-Tailed Significance)
" . " = Coefficient cannot be computed
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* Significance > .01.

**Key**

SDLR - Self-directed learning readiness score  
ACCE - Abstract-concrete score  
AERO - Active-reflective score  
AGE1 - Square root of age (years)  
AGE2 - Square of age (years)  
AGE3 - Cube of age (years)  
AGE4 - 1/age (years)  
TECH - Years of technical experience  
PROF - Years of professional experience  
OTHR - Other type of work experience  
FULL - Full-time employment  
PART - Part-time employment
APPENDIX C: ADULT LEARNING QUESTIONNAIRE
ADULT LEARNING QUESTIONNAIRE

Part 1

Demographic data

What is your:
- gender? Male ____ Female ____
- age? ____ years
- national origin? ________________________
- current degree program? M.S. ____ Ph.D ____
- current academic major? ________________________
- enrollment status? Full time ____ Part time ____

What degrees do you have?

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<td>M.S.</td>
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<tr>
<td>Ph.D.</td>
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How many years of prior work experience do you have in the following occupational categories by employment types?

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<tr>
<th>Category</th>
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<th>Full-time employment</th>
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<tr>
<td>Technical</td>
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<tr>
<td>Other (Specify)</td>
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1
Part 2

INSTRUCTIONS: Below you will be asked to complete 12 sentences. Each has four endings. Rank the endings for each sentence according to how well you think each one fits how you would go about learning something. Try to recall some recent situations where you had to learn something new, perhaps in your job. Then, using the spaces provided, rank a "4" for the sentence ending that describes how you learn best, down to a "1" for the sentence ending that seems least like the way you would learn. Be sure to rank all the endings for each sentence unit. Please do not make the

Example of completed sentence set:

0. When I learn: 4 I am happy 1 I am fast 2 I am logical 3 I am careful

REMEMBER: 4 = most like you
3 = second most like you
2 = third most like you
1 = least like you

AND: You are ranking across, not down.

1. When I learn: I like to deal with my feelings. I like to watch and listen. I like to think and listen. I like to be doing things.

2. I learn best when: I trust my hunches and feelings. I listen and watch carefully. I rely on logical thinking. I work hard to get things done.

3. When I am learning: I have strong feelings and reactions. I am quiet and reserved. I tend to reason things out. I am responsible about things.

4. I learn by: I like to feel. I like to watch. I like to think. I like to do.

5. When I learn: I am open to new experiences. I look at all sides of issues. I like to analyze think, break them down into their parts. I like to try things out.

6. When I am learning: I am an intuitive person. I am an observing person. I am a logical person. I am an active person.

7. I learn best from: personal relationships. observation. rational theories. a chance to try out and practice.

8. When I learn: I feel personally involved in things. I take my time before acting. I like ideas and theories. I like to see results from my work.

9. I learn best when: I rely on my feelings. I rely on my observations. I rely on my ideas. I can try things out for myself.

10. When I am learning: I am an accepting person. I am a reserved person. I am a rational person. I am a responsible person.

11. When I learn: I get involved. I like to observe. I evaluate things. I like to be active.

12. I learn best when: I am receptive. I am careful. I analyze ideas. I am practical
Part 3

INSTRUCTIONS: This part of the questionnaire is designed to gather data on learning preferences and attitudes towards learning. After reading each item, please indicate the degree to which you feel that statement is true of you. Please read each statement carefully and circle the number of the response which best expresses your feeling. There is no time limit for the questionnaire. Try not to spend too much time on any one item, however. Your first reaction to the question will usually be the most accurate.

RESPONSES

ITEMS:

1. I'm looking forward to learning as long as I'm living.
   - 1. Almost never true of me; I hardly ever feel this way.
   - 2. Seldom true of me; I usually feel this way.
   - 3. Sometimes true of me; I feel this way at least half the time.
   - 4. Usually true of me; I feel this way more than half the time.
   - 5. Almost always true of me; I almost always feel this way.

2. I know what I want to learn.

3. When I see something that I don't understand, I stay away from it.

4. If there is something I want to learn, I can figure out a way to learn it.

5. I love to learn.

6. It takes me a while to get started on new projects.

7. In a classroom, I expect the teacher to tell all class members exactly what to do at all times.

8. I believe that thinking about who you are, where you are, and where you are going should be a major part of every person's education.

9. I don't work very well on my own.
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<td>10.</td>
<td>If I discover a need for information that I don't have, I know where to go to get it.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>11.</td>
<td>I can learn things on my own better than most people.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>12.</td>
<td>Even if I have a great idea, I can't seem to develop a plan for making it work.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>13.</td>
<td>In a learning experience, I prefer to take part in deciding what will be learned and how.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>14.</td>
<td>Difficult study doesn't bother me if I'm interested in something.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>15.</td>
<td>No one but me is truly responsible for what I learn.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>16.</td>
<td>I can tell whether I'm learning something well or not.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>17.</td>
<td>There are so many things I want to learn that I wish that there were more hours in a day.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>18.</td>
<td>If there is something I have decided to learn, I can find time for it, no matter how busy I am.</td>
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<td>2</td>
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<td>4</td>
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<tr>
<td>19.</td>
<td>Understanding what I read is a problem for me.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>20.</td>
<td>If I don't learn, it's not my fault.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>21.</td>
<td>I know when I need to learn more about something.</td>
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<td>4</td>
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<tr>
<td>22.</td>
<td>If I can understand something well enough to get a good grade on a test, it doesn't bother me if I still have questions about it.</td>
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<td>4</td>
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<td>23.</td>
<td>I think libraries are boring places.</td>
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<td>4</td>
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<tr>
<td>24.</td>
<td>The people I admire most are always learning new things.</td>
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<td>2</td>
<td>3</td>
<td>4</td>
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</tbody>
</table>
25. I can think of many different ways to learn about a new topic.
26. I try to relate what I am learning to my long-term goals.
27. I am capable of learning for myself almost anything I might need to know.
28. I really enjoy tracking down the answer to a question.
29. I don’t like dealing with questions where there is not one right answer.
30. I have a lot of curiosity about things.
31. I'll be glad when I'm finished learning.
32. I'm not as interested in learning as some other people seem to be.
33. I don’t have any problem with basic study skills.
34. I like to try new things, even if I'm not sure how they will turn out.
35. I don’t like it when people who really know what they’re doing point out mistakes that I am making.
36. I'm good at thinking of unusual ways to do things.
37. I like to think about the future.
38. I'm better than most people are at trying to find out the things I need to know.
39. I think of problems as challenges, not stop signs.
40. I can make myself do what I think I should.
<table>
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<th></th>
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<th>Almost never true of me; I hardly ever feel this way.</th>
<th>Not often true of me; I feel this way less than half the time.</th>
<th>Sometimes true of me; I feel this way about half the time.</th>
<th>Usually true of me; I feel this way more than half the time.</th>
<th>Almost always true of me; I feel this way more than very few times when I don’t feel this way.</th>
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<td>I'm happy with the way I investigate problems.</td>
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<td>5</td>
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<td>I become a leader in group learning situations.</td>
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<td>5</td>
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<td>I enjoy discussing ideas.</td>
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<td>I don't like challenging learning situations.</td>
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<td>45.</td>
<td>I have a strong desire to learn new things.</td>
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<td>3</td>
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<td>5</td>
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<tr>
<td>46.</td>
<td>The more I learn, the more exciting the world becomes.</td>
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<td>Learning is fun.</td>
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<td>48.</td>
<td>It's better to stick with the learning methods that we know will work instead of always trying new ones.</td>
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<td>5</td>
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<td>49.</td>
<td>I want to learn more so that I can keep growing as a person.</td>
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<td>5</td>
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<td>50.</td>
<td>I am responsible for my learning — no one else is.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>51.</td>
<td>Learning how to learn is important to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>52.</td>
<td>I will never be too old to learn new things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>53.</td>
<td>Constant learning is a bore.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>54.</td>
<td>Learning is a tool for life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>55.</td>
<td>I learn several new things on my own each year.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>56.</td>
<td>Learning doesn’t make any difference in my life.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>57.</td>
<td>I am an effective learner in the classroom and on my own.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>58.</td>
<td>Learners are leaders.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
APPENDIX D: COVER LETTER
Dear Graduate Student,

Your name was selected through a random sample of Iowa State Graduate students to participate in research on adult learning. The research is designed to further professional understanding about individual differences and preferences of adults in learning.

The information provided will be the basis of my Ph. D. dissertation in the department of Professional Studies in Education. And the results of the study will help adult educators and practitioners better incorporate adult idiosyncrasies into planning and implementing educational programs for adults.

Please take 15-20 minutes to complete the attached questionnaire. Return the completed questionnaire in the enclosed return addressed envelope by 3-5-89. Please be sure to complete all three parts.

All responses and information provided will be kept in strictest confidence. Individuals will not be identified and no reference will be made relating individual responses in any written or oral reports. Only summaries of all subjects' responses will be reported.

Thanks for your usual cooperation.

Sincerely,

Babatunde Adenuga
Graduate Student
Adult and Extension Education
Iowa State University
Ames, IA 50010
APPENDIX E: REMINDER LETTER
Fellow Graduate Student,

This letter is a reminder that you received a questionnaire — "Adult Learning Questionnaire" a couple of weeks ago. Your name was selected through a random sample of Iowa State graduate students to participate in research on adult learning. Since random samples are small representations of larger populations it is important that as many data sets as possible are available. Therefore your questionnaire is vital to accurate interpretations and conclusions of this research.

Please complete and return your "Adult Learning Questionnaire" to me by 3-25-89.

Thanks for your cooperation.

Babatunde Adenuga
Graduate Student
Adult and Extension Education
Iowa State University
Ames, IA 50011
APPENDIX F: IOWA STATE UNIVERSITY HUMAN SUBJECTS COMMITTEE APPROVAL
INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY

(Please follow the accompanying instructions for completing this form.)

1. Title of project (please type): SELF-DIRECTED LEARNING READINESS AND LEARNING STYLE PREFERENCES OF ADULT LEARNERS.

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

   Babatunde O. Adenuga 8-31-88
   Typed Name of Principal Investigator Date Signature of Principal Investigator

   N226 Lagomarcino Hall 294-9468
   Campus Address Campus Telephone

3. Signatures of others (if any)

   Date Relationship to Principal Investigator

   [Signature]

   [Relationship]

   Major Professor
   Professional Studies -Adult & Ext. Ed

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

   - Medical clearance necessary before subjects can participate
   - Samples (blood, tissue, etc.) from subjects
   - Administration of substances (foods, drugs, etc.) to subjects
   - Physical exercise or conditioning for subjects
   - Deception of subjects
   - Subjects under 14 years of age and(or)
   - Subjects 14-17 years of age
   - Subjects in Institutions
   - Research must be approved by another Institution or agency

5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

   - Signed informed consent will be obtained.
   - Modified informed consent will be obtained.

6. Anticipated date on which subjects will be first contacted: Oct. 25 88
   Anticipated date for last contact with subjects: Dec. 25 88

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments: Not Applicable

8. Signature of Head or Chairperson Date Department or Administrative Unit

9. Decision of the University Committee on the Use of Human Subjects in Research:

   - Project Approved
   - Project not approved
   - No action required

   George G. Keras
   Name of Committee Chairperson Date Signature of Committee Chairperson